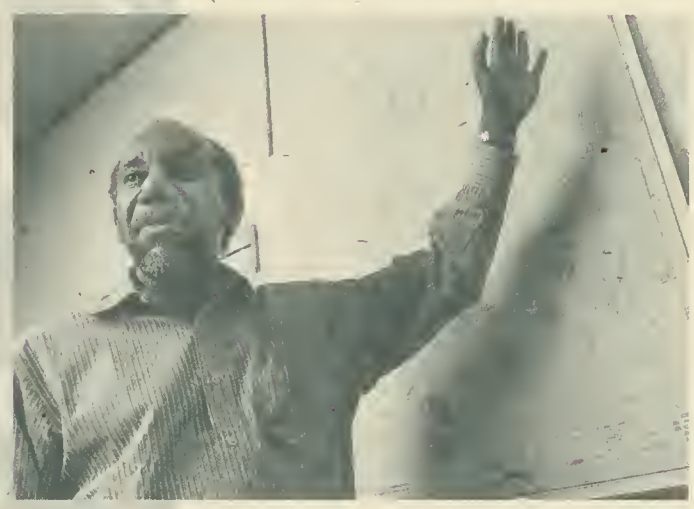
HARVARD SCHOOL OF PUBLIC HEALTH

Advancing the Public's Health
through Learning and Discovery



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Every effort is made to ensure the information contained in this *Official Register* is accurate at the time of publication. However, the Harvard School of Public Health reserves the right to make changes without notice in tuition and fees, admission and degree requirements, courses of instruction, and other information contained herein. These changes will govern all students, including students who matriculated prior to the changes coming into effect.

As a matter of policy, law, and commitment, the Harvard School of Public Health does not discriminate against any person on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or handicap in admission to, access to, treatment in, or employment in its programs and activities. The following person has been designated to handle inquiries about nondiscrimination programs: Carolyn Everette, Director of Human Resources, 677 Huntington Avenue, Boston, MA 02115 (phone: 617-432-1046). Inquiries about the application of nondiscrimination policies concerning race, color, national origin, age, sex, or handicap may also be referred to the Regional Director, Office for Civil Rights, US Department of Education, J.W. McCormack POCH, Room 222, Post Office Square, Boston, MA 02109.

According to Chapter 151c, Section 2B, of the General Laws of Massachusetts, any student in an educational or vocational training institution, other than a religious or denominational training institution, who is unable, because of his or her religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such examination or requirement which he or she may have missed because of such absence on any particular day, provided that such makeup examination or work shall not create an unreasonable burden upon the school. No fees of any kind shall be charged by the institution for making such opportunity available to the student, and no adverse or prejudicial effects shall result to any student for availing himself or herself of these provisions.

Campus Security

In compliance with the Student Right-to-Know and Campus Security Act of 1990, the Harvard University Police Department publishes an annual security booklet entitled "Playing It Safe." The booklet describes Harvard's security policies, provides statistical information on the occurrence of crime on campus, and outlines some of the counseling programs the university offers. You may obtain a copy of "Playing It Safe" from the HSPH Admissions Office, 677 Huntington Avenue, Boston, MA 02115 (phone 617-432-1031).

The Harvard School of Public Health is accredited by the Council on Education for Public Health.

Harvard University On-Line Course Catalogs

Course information from all of Harvard's faculties is available on-line. The on-line course catalogs contain course descriptions, faculty information, and general information about taking classes at Harvard University. The system allows for searching information across Harvard schools (for example, for searching such interdisciplinary topics as the environment or ethics) as well as within a single school. The course catalogs are available through Gopher. Gopher is a tool, developed by the University of Minnesota, that facilitates browsing and searching information on the Internet. Gopher is also available through the World Wide Web, a similar Internet tool which uses hypertext.

To access the course catalogs via Gopher, configure Gopher software to connect to **courses.harvard.edu**

To access the course catalogs via Telnet, telnet to courses.**harvard.edu**
At the resulting login prompt, type **courses** and press **return.**

To access the course catalogs via the World Wide Web, configure World Wide Web software to point to address **url: htlp://www.harvard.edu/**
Choose VINE at resulting menu.

To access the course catalogs with a modem and communications software,

- Set up communications software as follows: Data bits: 8; parity: N; stop bits: 1; duplex: full; terminal emulation: vt100; maximum speed: 14.4 kbps
- Dial number: 617-496-8500 (on campus: 6-8500)
- At the resulting menu, choose **COURSE CATALOG** (number 4 on the menu) and follow instructions.

From the Dean

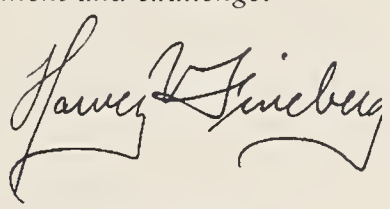
While the twentieth century has been an era of remarkable health progress, many threats to public health loom large today. Infectious diseases vanquished early in the century have been replaced by new diseases, such as AIDS, and by a surge in cancer and other chronic illnesses. Other problems, such as violence and injury, not formerly considered public health problems, are now within the purview of public health professionals. The preservation and enhancement of the health of populations demand prodigious professional skills as well as the integration of many disciplines into a broad strategy embracing the way we live, our environment, and our system of health care.

The extensive scope of public health is reflected in the range of courses, departments, centers, programs, and facilities described in this Official Register. The interests and expertise of faculty at the school are similarly diverse, extending across biological sciences, social sciences, numeric disciplines, and more. These professionals work together to overcome real-world public health challenges, such as environmental hazards, the threat of new diseases, choices of lifestyle that rob individuals of many healthy years, inadequate access to health care and other necessities of life, and the great parasitic diseases that kill and handicap millions around the globe. The school's multidisciplinary approach ensures that students gain both a broad perspective on public health and in-depth training in their field of interest.

This Register contains a wealth of information about educational opportunities at the Harvard School of Public Health. Though we have endeavored to make it accurate and comprehensive, it is necessarily an incomplete description of the learning experience available at the school. HSPH is a place to acquire new skills; a place to enrich one's professional perspective by interacting with fellow students, with HSPH faculty, and with scholars from cooperating schools and institutions; a place to gain a more sophisticated understanding of health sciences, health issues, and solutions to health problems; a place to test one's ideals, objectives, and imagination against the imposing array of biological, behavioral, social, economic, and political barriers to improved public health. For those seeking more details on programs or departments, we have incorporated contact information for appropriate resource people throughout the Register and invite prospective students to call or write at any time.

Dean Harvey V. Fineberg (left) presents the Alumni Award of Merit to Doreleena Sammons-Posey, SM'79, health promotion and disease prevention services director for the New Jersey Department of Health.

The overriding mission of HSPH, to advance the public's health through learning and discovery, comprises four objectives: to educate scientists, professionals, and leaders for public health; to foster new discoveries and develop better technologies for improved health of individuals and populations; to inform and influence debate on key public health issues; and to strengthen capacities and services that meet health needs in the community. We believe we are engaged in a vital enterprise of central importance to society. We welcome those who join us at the school to share in that sense of excitement and challenge.



Harvey V. Fineberg
Dean

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Academic Calendar, 1995-96

July 5-August 18	Summer Institute for Public Health Studies in Quantitative Methods (see page 78)
July 5-August 18	Summer Program in Clinical Effectiveness (see page 79)
August 21-September 1	English for Professional Communication (see page 79)
September 5-15	Advance Seminar Program (see page 79)
September 7-8	Fall semester registration
September 11-15	New student orientation
September 18	*a* and *ab* period courses begin
October 9	Columbus Day, a holiday
November 9	*a* period courses end
November 10	Veteran's Day, a holiday
November 13	*b* period courses begin
November 23-26	Thanksgiving recess
December 15	Deadline for application to PhD programs in the natural sciences, offered through the Graduate School of Arts and Sciences (GSAS); deadline for application to other PhD programs offered through GSAS is December 29
December 20-January 1	Winter recess
January 2	Deadline for application to HSPH doctoral (SD and DPH) and Master of Science (SM) programs; deadline for application to Master of Public Health (MPH) and Master of Occupational Health (MOH) programs in priority admission cycle
January 15	Martin Luther King, Jr. Day, a holiday
January 19	*ab* and *b* period courses end
January 22-26	*e* period (optional special studies and field trips)
January 29	*c* and *cd* period courses begin
February 19	President's Day, a holiday
February 28	Final deadline for completing application to MPH and MOH programs for review in second admission cycle
March 22	*c* period courses end
March 25-29	*f* period (optional special studies and field trips)
April 1	*d* period courses begin
May 24	*cd* and *d* period courses end
May 27	Memorial Day, a holiday
June 6	Commencement

Photographers: Dobbin Bookman, Richard Chase, Kent Dayton, Liza Green, Mary Lee, Ritu Sadana, and Barbara Steiner

THE HARVARD SCHOOL OF PUBLIC HEALTH

THE HISTORY OF PROFESSIONAL EDUCATION IN PUBLIC HEALTH at Harvard University began in 1909 with the establishment of the Department of Preventive Medicine and Hygiene in the Medical School, the first such department in the United States. The first Doctor of Public Health degree was conferred in 1911, the same year the Department of Sanitary Engineering was established in Harvard's Graduate School of Engineering. In 1913, the Department of Tropical Public Medicine was organized in the Medical School, followed in 1918 by the Division of Industrial Hygiene.

Also in 1913, the Harvard-MIT School of Health Officers was formed under the joint management of Harvard University and the Massachusetts Institute of Technology (MIT). The School of Health Officers operated until 1922, when an endowment from the Rockefeller Foundation made possible the founding of the Harvard School of Public Health (HSPH). During the early years of the school's operation, several of its departments functioned jointly with counterparts in the Medical School, sharing facilities and faculty. In 1946, HSPH separated from the Medical School and became an autonomous unit of Harvard University.

HSPH Today

Today, HSPH includes over 250 faculty members: biostatisticians and epidemiologists, health analysts and educators, nutritional biochemists and cancer biologists, specialists in environmental and occupational health, experts in behavioral and population sciences, and many others. Their work proceeds within five comprehensive, cross-cutting themes, whose objectives are as follows:

- **AIDS, cancer, and heart disease: Confronting the most urgent and important diseases of our time, with an emphasis on prevention.** To these health problems the school brings the tools of population-level analysis (epidemiol-

The school's main buildings for research, teaching, and administration are located in the heart of Boston's hospital district and Harvard University's Longwood campus. The facilities adjoin those of Harvard's Medical School, School of Dental Medicine, and Francis A. Countway Library of Medicine, and are near Children's Hospital Medical Center, Beth Israel Hospital, Brigham and Women's Hospital, and other Harvard-affiliated hospitals. The school is within walking distance of many cultural institutions, such as Boston's Museum of Fine Arts, and public transportation is readily available to other parts of Boston and Cambridge, where students may cross-register for courses at other Harvard schools and at MIT.

The library needs of the school are served principally by the Francis A. Countway Library of Medicine, which combines the resources of the Harvard Medical Library and the Boston Medical Library. With recorded holdings of more than 600,000 volumes and 4,200 current periodicals, it is one of the largest medical or health-related libraries in the country. The Countway also owns an extensive collection of historical materials dating from the fifteenth century. Students have borrowing privileges throughout the Harvard University library system. The Boston Public Library, MIT libraries, and other Boston-area libraries add to the total book and periodical resources available to students.

HSPH operates its own Instructional Computing Facility dedicated to serving the course work and thesis computing needs of its students and faculty. Resources include SUN Unix computers, IBM personal computers, APPLE Macintosh computers, a Novell network, and dot matrix and laser printers; a wide array of software, including statistical packages, programming languages, analytical programs, and word-processing packages; and services such as remote dial-in, file transfer, electronic mail, connections to national and in-

ogy and biostatistics) combined with the exploration of biologic mechanisms (increasingly at the molecular level), consideration of social science aspects of disease, and analysis of policy options.

- **Behavior, nutrition, and lifestyle: Educating and empowering people to make healthful choices at every stage of their lives.** Focusing on alcohol and drug abuse, smoking, unsafe sex, violence, highway accidents, and aspects of diet, the school seeks to discover social and behavioral factors that challenge the health of populations, then to design and test effective change strategies.

- **The environment: Analyzing risks and devising new strategies for a healthier environment and a safer workplace.** Scientists and analysts at the school measure human exposure to environmental hazards, evaluate resulting health effects, and assess the measurement, management, and control of risk.

- **Health care: Making health systems more effective, efficient, and responsive to the needs of the world's people.** Faculty working on issues of health care reform have expertise in political analysis, public opinion polling, economics and finance, decision science, technology assessment, cost-effectiveness analysis, health management, and law and ethics.

- **World health: Strengthening analytic capacities and decision making globally and applying modern science to longstanding and emerging health threats.** The school works toward the solution of health problems in developing countries by training leaders who can confront these problems, by applying available low-cost yet effective technologies, by developing new vaccines and other interventions, and by strengthening policy research, economic analysis, and management. The school serves as a crossroads in international health, attracting health policymakers and professionals from around the world.

The student body comprises more than 700 students from throughout the United States and over forty other countries. Students come from an array of fields, and include health services administrators, epidemiologists, nurses, dentists, lawyers, statisticians, environmental scientists, engineers, research assistants, psychologists, and social workers. Approximately 30 percent are physicians. Students in some programs may enroll immediately after earning an undergraduate degree.

Degrees Offered by HSPH

HSPH offers programs leading to the graduate degrees of Master of Public Health (MPH), Master of Science (SM) in a public health discipline, Master of Occupational Health (MOH), Doctor of Public Health (DPH), and Doctor of Science (SD) in a public health discipline. The school also participates in Doctor of Philosophy (PhD) programs offered through the university-wide Program in Health Policy (see page 51) and the Biological Sciences in Public Health Program (see page 10). Diplomas for the MPH, DPH, and MOH degrees show the degree only. Diplomas for the SM and SD degrees also show the name of the department; in the Department of Environmental Health a concentration is designated as well.

For all HSPH programs, the Committee on Admissions and Degrees considers applicants' academic ability, the relevance of their previous education and experience, and their overall qualifications for graduate education in public health, including those qualities of character that reflect upon an individual's suitability to be a public health professional. Applicants must also satisfy the requirements of the department or program to which they are applying. Applicants to doctoral programs must demonstrate the ability to undertake original research.

In general, the master's degrees are considered terminal degrees for individuals who seek professional positions in public health, though a few departments view the SM as preparation for doctoral study. Occasionally, students wish to continue their studies at HSPH after completing an MPH degree; these students may apply to an SM or a doctoral program and often undertake a field placement during the summer between the two programs. The doctoral programs are designed for students with interests in the scientific basis of public health and preventive medicine who wish to pursue academic or research careers. Because specific prerequisites and

degree requirements vary with the discipline or field of specialization, prospective applicants should consult the sections of this *Register* that describe degree programs in greater detail and are invited to consult with the individuals designated in the text as contact persons for the various departments and programs. In the most general terms, requirements for the HSPH degree programs are as follows.

Master of Public Health At HSPH, the MPH program is geared primarily toward midcareer professionals who hold a doctoral degree in medicine, dentistry, veterinary medicine, law, or other fields related to public health, or a master's degree in nursing. The MPH is a nine-month (two-semester, 40-credit) program. MPH students concentrate in one of seven career-oriented areas: international health, health care management, public management and community health, law and public health, occupational and environmental health, quantitative methods, or clinical effectiveness. Please see page 6 for further information about the program.

Master of Science SM programs differ considerably from department to department, both in their overall goals and in their specific admission and degree requirements. In general, eighteen-month (four-semester, 80-credit) SM programs are intended for applicants holding a bachelor's degree in a relevant field; some departments require or prefer applicants to have some relevant work experience. A few departments also offer nine-month (two-semester, 40-credit) SM programs for applicants with a prior master's or doctoral degree or substantial work experience. Candidates for an SM degree must fulfill the school-wide requirements in biostatistics (BIO 200, BIO 201, or BIH 219c) and epidemiology (EPI 200 or EPI 201), as well as any requirements of the department in which they are enrolled. Students in professional SM programs must also fulfill core requirements in environmental health, health policy/management, and social/behavioral sciences.

Master of Occupational Health The MOH program is designed to train physicians in the public health disciplines relevant to preventing occupational disease and injury. This nine-month (two-semester, 40-credit) degree program is usually taken as part of a two-year residency in occupational medicine. Please see page 29 for information about the program.

Doctor of Science Applicants to the SD program must hold at least a bachelor's degree. In some instances an applicant is expected to complete an SM program at the school before being granted admission to doctoral study, in which case the student will first be admitted to an SM program. Candidates for the SD degree must fulfill the following basic requirements: successful completion of course work in one major field (20 credits) and two minor fields (10 credits each) and of courses in introductory epidemiology (EPI 200 or EPI 201) and intermediate biostatistics (ordinarily BIO 210cd and BIO 211cd); successful completion of the school-wide oral qualifying examination, usually by the end of the second year; successful completion of a program of independent and original research in one of the basic disciplines of public health; the presentation and submission of this research in an acceptable thesis and the public defense of the thesis; and payment of at least two years of full-time tuition and one year of full-time reduced tuition. The *Student Handbook*, distributed during fall registration, provides detailed information about school-wide requirements and procedures. Departments may stipulate specific course and examination requirements beyond the school-wide requirements, and prospective applicants are encouraged to contact the department or program to which admission is sought for detailed information.

Doctor of Public Health Most applicants for admission to the DPH program hold a doctoral degree in medicine, dental medicine, or veterinary medicine; consideration is also given to applicants who hold an advanced degree in one of the disciplines basic to public health. The applicant must hold, or be in progress toward, an MPH degree, or its equivalent, from an approved institution. Once admitted to the school, DPH candidates are subject to the same academic requirements as candidates for the SD degree, described above.

ternational networks (such as BITNET and INTERNET), user assistance, short courses, and computer accounts for funded research. Many academic departments also provide computing resources for their students. Harvard's central Office for Information Technology offers members of the university many additional services (some for a fee), such as classes on various computer topics, discounted hardware and software purchases, user groups, and technical support.

Administrative Officers of the Harvard School of Public Health

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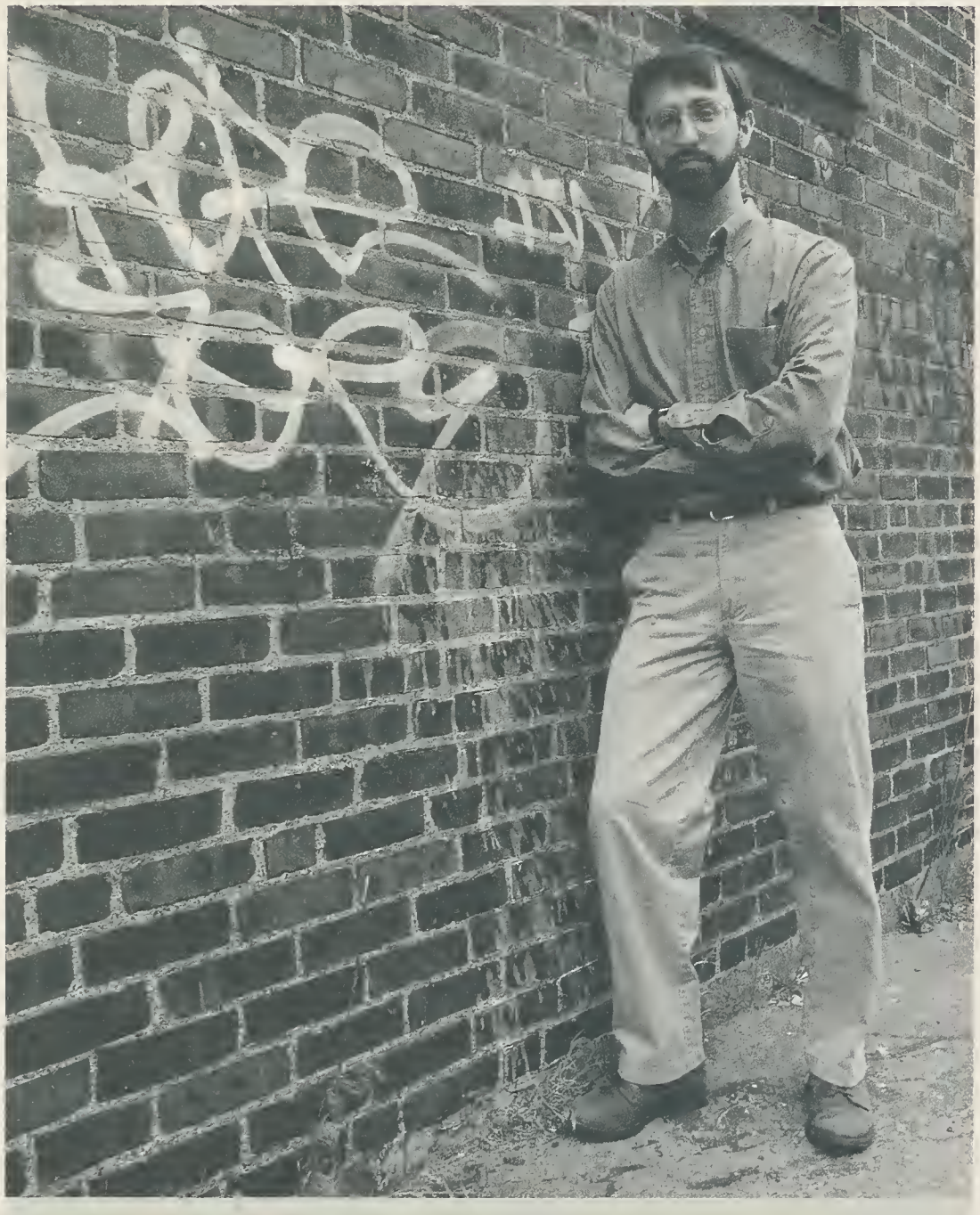
MASTER OF PUBLIC HEALTH PROGRAM

The Master of Public Health (MPH) degree is the recognized professional credential for leadership in public health. The program is organized around seven career-oriented concentrations, each comprising a common core curriculum and specialty electives. The program emphasizes active, student-directed learning, problem-solving, and the acquisition of skills essential to the practice of public health.



Louis Appel
MPH/Public Management and Community Health

An MD/MPH student, Louis first became interested in public health after conducting research on Medicaid while an undergraduate. "When I started medical school I co-coordinated an urban health project which provided summer stipends for students to work in community health organizations. That experience, plus my clinical work, really heightened my desire to think about health issues beyond individual patients," remembers Louis, who has just completed a practicum in a neighborhood health center in Dorchester.

"For my practicum, I worked on an immunization proposal that depends on increased cooperation between various community organizations and the health center. It's a perfect opportunity for learning and working with different people," he adds. In addition to a future career in a community health setting, Louis would like to be "an effective advocate for public health—both at the local and national policy levels."

MPH students come from all parts of the world, bringing to the program a wide variety of backgrounds and experiences. The majority are midcareer professionals preparing for advancement in their organizations or for transition into new fields. Most hold a professional degree in medicine, nursing, dentistry, veterinary medicine, or law. Some hold a doctoral degree in a field related to public health, such as biology, behavioral sciences, nutrition, other natural and social sciences, economics, or engineering. On occasion, an individual is admitted to the program who holds a master's degree in a field closely related to public health, such as social work, and who has at least three years of relevant work experience.

Students enrolled in an MD, DMD, or DDS program and who have a career interest in public health and preventive medicine are also invited to apply for admission to the MPH program. Generally, these students undertake the MPH program while on leave of absence between the third and fourth year of medical or dental school. They receive the MPH degree upon successful completion of both programs and conferral of the doctoral degree. Students at Harvard Medical School may wish to inquire about the possibility of undertaking an integrated MD-MPH program.

MPH candidates may complete the requirements for the degree on a full-time or part-time basis (or may change from one status to the other). Full-time students normally complete the program in two semesters (September through May). Part-time students complete the requirements for the degree over a period of two or three years. Courses taken for credit in the Summer Institute for Public Health Studies in Quantitative Methods (see page 78) may be counted toward the degree.

MPH students are required to complete a minimum of 40 course credits and must fulfill core

requirements in the fundamental public health disciplines. These requirements include an interdisciplinary course on the ethical basis of the practice of public health (ID 250 or 251); the practice course for the chosen concentration (see course listings below); one course in biostatistics (BIO 200 or 201); one course in epidemiology (EPI 200 or 201); one course in environmental health (usually EH 201 or 202); one course in health and social behavior; and 2.5 to 5 credits in management courses relevant to the chosen concentration.

Applicants to the MPH program select one of seven areas of concentration in which they complete a second tier of recommended courses. Each of these concentrations offers a selection of optional tracks, or interest areas, allowing students to pursue in depth one or more areas of particular relevance to their career goals. The tracks enable students in the interdisciplinary MPH program to establish a second "home" in one of the school's academic departments, such as Health Policy and Management or Maternal and Child Health. Beyond the program and concentration requirements, students are encouraged to consult with faculty advisors to choose elective courses best suited to their needs. Concentration goals, tracks, and general requirements are described below.

International Health This concentration is intended to prepare health professionals for leadership roles in the practice of international health, with a special emphasis on the health problems of disadvantaged populations in developing countries. The concentration enables students to work toward health improvement by taking account of demographic and epidemiologic changes, the organization of health care and evolving patterns of health care demand, new scientific knowledge and technology, and the roles of professionals in policy, law, communications, and advocacy. It also assists them in finding new ways to strengthen national and institutional capacities for health policy making and management. Graduates of the program have assumed leadership positions in national ministries of health, international organizations, donor aid agencies, private voluntary organizations, research and academic institutions, and the private sector.

The International Health concentration has no defined tracks. Students are encouraged to choose elective courses best suited to their professional development.

Health Care Management This concentration prepares professionals for leadership positions in health care organizations (such as hospitals and health maintenance organizations) and organizations that deal with health care providers (such as government, health insurers, and pharmaceutical companies). Program graduates fill many roles, including health service administrator, management consultant, health care policy analyst, and health insurance executive. Others go on to undertake doctoral study.

Beyond the MPH core requirements, students are encouraged to elect one of five tracks geared to different professional interests, within which they take at least 5 credits chosen from clusters of recommended courses. Tracks include dental health care policy, health care evaluation, health care organization and finance, quality management, and services management.

Public Management and Community Health This concentration focuses on the promotion of health and the prevention of disease in populations through the preparation of health professionals with leadership skills in public health. Courses emphasize strategies for establishing health objectives, data collection and analysis, the management of fiscal and manpower resources, consultation, communication, advocacy, and policy formation in the public sector. The program prepares students for positions in diverse public health and nonprofit settings, including federal, state, and local government, voluntary health organizations, and community-based primary care settings. Positions filled by program graduates include public health administrator, health planner, health policy analyst, and health educator; others have gone on to undertake doctoral study.

Beyond the MPH core requirements, students are encouraged to develop expertise in a substantive area by selecting a track geared to their professional interests. Tracks include maternal and child health, finance and regulation, mental health and substance abuse, and health promotion and disease prevention.

Program Director: Gareth M. Green, MD, Associate Dean for Professional Education

For more information about the MPH program, please contact Roberta Gianfortoni, Director for Professional Training, Office of Professional Education, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0090
Fax: 617-432-3365
E-mail: rgianfor@hsphsun2.harvard.edu

The MPH program serves as a required academic year for residency training in preventive medicine, aerospace medicine, or occupational medicine. Please see page 29 for information about the occupational medicine residency.

Law and Public Health This concentration is designed to train leaders in the field of public health law. The course of study introduces lawyers to the science of public health, provides them with skills in analysis of public health problems, and allows them to design a curriculum that will meet their particular interests. The concentration prepares graduates for positions in a variety of settings, including work in a health law or environmental section of a law firm, positions in local, state, and federal government, or posts in academia.

Beyond the MPH core requirements, lawyers are encouraged to develop a specialization in a substantive area by choosing among clusters of recommended courses in such fields as health care delivery or environmental health.

Occupational and Environmental Health This concentration is designed for physicians and other professionals who intend to practice occupational medicine or to hold responsible positions in occupational and/or environmental policy and management. The curriculum focuses on assessing workplace hazards, the physiology and biomechanical aspects of work, and a practical problem-solving approach to health problems in various work settings.

The concentration features three areas of special interest: environmental health, occupational health, and occupational medicine. The occupational medicine track is designed for physicians who intend to satisfy the requirements of the American Board of Preventive Medicine for certification in Occupational Medicine. The requirements for the Master of Occupational Health (MOH) degree are similar to those of the MPH in occupational medicine; physicians may elect either degree. Please see page 29 for information about the MOH program.

Quantitative Methods This concentration prepares students for public health careers in which the analysis of numerical data plays a pivotal role. It is designed for midcareer health professionals and for those in the early stages of their careers who plan to emphasize the application of quantitative methods to decision making and to etiologic research in public health. Program graduates commonly supervise population-based health research in government, nongovernmental organizations, and private industry. Many graduates return to practices in academic medicine.

Beyond the MPH core requirements, concentrators must take an additional 2.5 credits of introductory epidemiology and 7.5 credits in intermediate/advanced biostatistics and epidemiology. Concentrators may choose advanced courses from any of the areas of quantitative study offered at HSPH or elsewhere in the university, including biostatistics, epidemiology, decision sciences, demography, needs assessment, and evaluation.

Clinical Effectiveness This concentration prepares physicians for clinical research responsibilities and for leadership roles in evaluating and improving all aspects of health care delivery. It is concerned with identifying the most appropriate, ethical, and cost-effective means of providing health care through prevention, early detection, or treatment, and is designed to provide the analytic and quantitative training necessary to evaluate clinical practices. Along with the broad perspective the program offers on general aspects of public health, this training provides a basis for identifying the health policy implications and public health benefits of the results of clinical investigations. Major areas of professional interest for concentrators include clinical epidemiology and biostatistics, cost-effectiveness analysis, medical decision analysis, health services research, quality improvement in health care, and measurement of health-related quality of life. The concentration is limited to clinicians enrolled initially in the Summer Program in Clinical Effectiveness (see page 79).

In addition to the MPH core requirements, concentrators must take BIO 213ab, *Applied Regression for Clinical Research*, and EPI 242abcd, *Seminar in Clinical Epidemiology*. The latter is a year-long seminar series built around faculty and student presentations of clinical investigations in progress which provide a mechanism for discussing general issues. Concentrators may choose other courses pertinent to areas of clinical investigation that are of particular interest.

Practice Courses for Master of Public Health Students, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information. Descriptions of other core courses and electives for the MPH program are included in the course listings of the respective departments.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

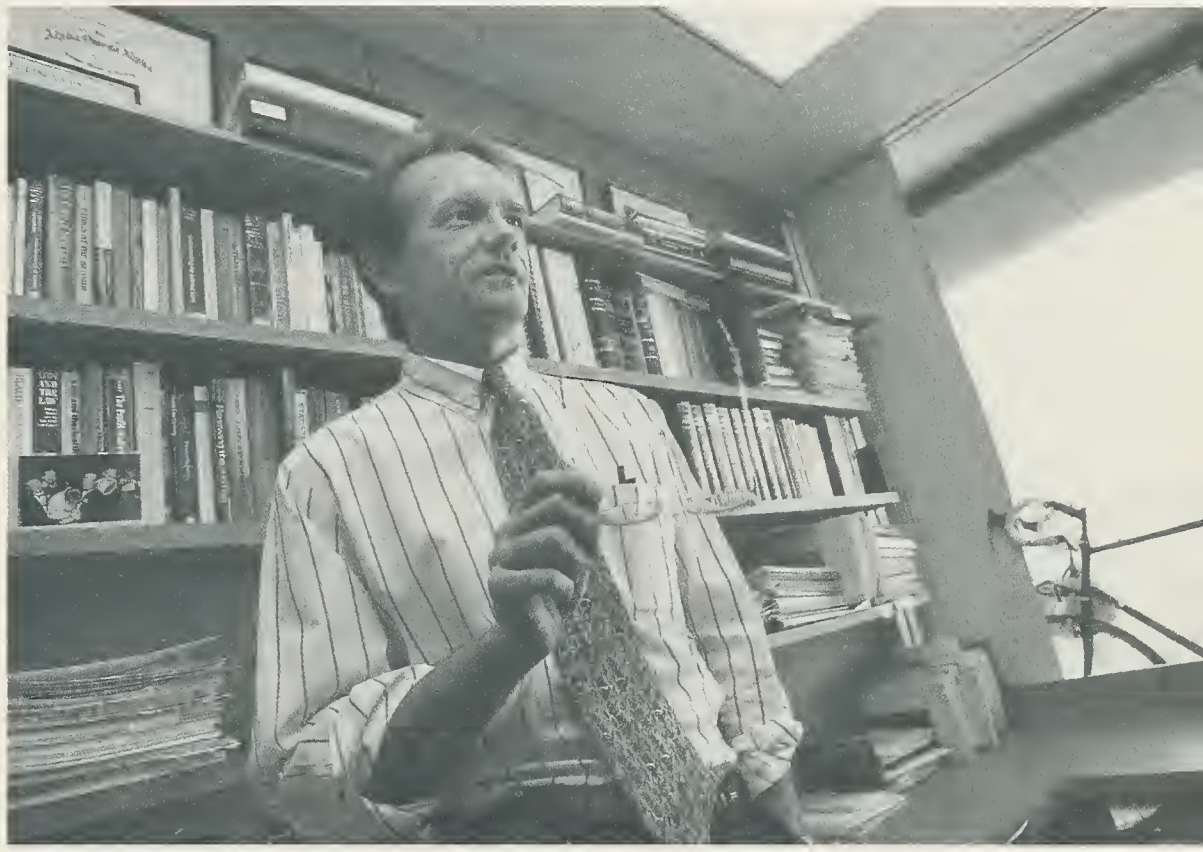
ID 250a. Ethical Basis of the Practice of Public Health (Roberts, Reich)
Provides a broad overview of the main philosophical and moral ideas that are used to resolve debates of public health policy. Helps students develop the capacity to analyze, criticize, evaluate, and construct policy-oriented arguments. (2.5 credits)

ID 251s. Ethical Basis of the Practice of Public Health: Health Care Delivery (Brennan)
Emphasizes US health care policy and modern medical ethics to explore the political theory of medical care. Helps health professionals understand the manner in which political economy and ethics interact in health care policy decisions. (2.5 credits)

ID 261cd. Practice of Health Care Management (Calkins, Caper, Danaher)
Seminars explore the social, political, economic, and professional forces acting to shape the future of health care in the US and other industrialized countries. Field work provides practical experience in health care management or health services research. (5 credits)

ID 262a. Practice of International Health (Cash, Chen, Evans)
Defines the scope of international health, highlights contemporary issues, and reviews case studies of policies and practices. Topics include world health and development, health transitions, disease control, primary health care, child survival, essential drugs, and evolving roles of international and nongovernmental organizations. (2.5 credits)

ID 263cd. Practice of Occupational Health (Smith, R. Goldman)
Focuses on the assessment of workplace hazards, the physiology and biomechanical aspects of work, and a practical approach to health problems in various work settings. Includes field trips to local industries. (5 credits)



Professor Troyen Brennan, who holds degrees in medicine, public health, and law, heads the MPH concentration in law and public health.

ID 264cd. Practice of Public Management and Community Health (Gardner)
Field work enables students to apply managerial and analytic techniques to problems confronting public or community health agencies. Seminars use case studies to explore the practice of public management and community health. (5 credits)

ID 265bc. Practice of Quantitative Methods (Monson, Stanley)
Explores practical and conceptual issues in the design, conduct, analysis, and evaluation of human studies through the discussion of current research and methodologies. Students design studies to address important health problems. (5 credits)

ID 330f. Field Trip
Gives students an overview of the activities of the Centers for Disease Control and Prevention (CDC) in Atlanta and an opportunity to meet individually with professional staff. Lectures and tutorials relate to such disciplines as occupational diseases, surveillance systems, epidemiology, control measures for chronic and infectious diseases, and CDC's role in international health. (1 credit)

DIVISION OF BIOLOGICAL SCIENCES

The Division of Biological Sciences (DBS) is an umbrella organization encompassing the HSPH Departments of Cancer Biology, Molecular and Cellular Toxicology, Nutrition, Tropical Public Health, and Environmental Health. The goal of the division is to coordinate the teaching and research activities of the constituent departments, which cooperate in the areas of student admission, curriculum planning, and the provision of financial assistance through graduate and postdoctoral training grants. In most of these departments, two doctoral degrees are offered: the Doctor of Philosophy (PhD) and the Doctor of Science (SD). In general, the PhD programs center on laboratory-based investigation in the biological sciences, while the SD programs emphasize epidemiological analysis.

Wendy Jade-Hernandez
PhD/Biological Sciences in Public Health

"I am the first DBS student chosen to participate in the Harvard-Markey Biomedical Scientist Training Program, in which we take the same courses as first- and second- year medical school students. The objective is to gain a broader perspective on the biological sciences," she says. "The classes are rigorous, but everyone is very supportive."

A graduate of the University of California system, Wendy concentrated in biology and benefited from two years of research at the first proton cancer treatment center in Loma Linda. "That sparked my research interests. From then on I knew I wanted to teach and conduct research in the biological sciences." Her interests are currently influenced by the expertise she has encountered at HSPH. "Cancer biology, environmental health, cardiovascular research—all are led by some of the biggest names in the field," she says.

Doctor of Philosophy in Biological Sciences in Public Health (BPH)

Students wishing to study cellular and molecular biology or physiology as they pertain to major problems in public health should apply to the Biological Sciences in Public Health program. This program offers the PhD degree through Harvard University's Graduate School of Arts and Sciences, Division of Medical Sciences, Committee on Biological Sciences in Public Health.

Participating HSPH departments offer PhD programs in the following areas:

- **Cancer Biology** Cancer Cell Biology, Virology, Immunology
  (Note: Applicants holding clinical degrees in human or veterinary medicine should apply to the SD program.)
- **Environmental Health** Physiology; other programs where the applicant has a significant interest in laboratory versus field work
- **Molecular and Cellular Toxicology** All concentrations
- **Nutrition** Nutritional Biochemistry
- **Tropical Public Health** Immunology and Molecular Biology of Parasitic and Other Infections, Tropical Public Health

These programs are described in the departmental sections of this *Official Register*. In general, the BPH program offers a firm foundation in the basic biomedical sciences, as well as in epidemiology and biostatistics. Specific courses supplement this core, as dictated by individual research concentrations.

Students in this program engage in laboratory rotations in three different research areas, to enable them to assess realistically their interests in a thesis project and to evaluate the suitability of the laboratory and the mentor. At the completion of these rotations, students select an area of concentration and a thesis research laboratory and complete the required curriculum. A qualifying examination must be passed before engaging in thesis work, and the thesis must be defended before the granting of the PhD. Some students also participate in the Harvard-Markey Biomedical Scientist Training Program, a new pathway of graduate education designed to offer PhD students a greater knowledge of human biology and disease.

Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Those deficient in one of these areas may be admitted provisionally on the condition that appropriate courses will be taken before and/or after entering the program. Applicants must take both the GRE general and subject tests by October in order to meet the application deadline of December 15.

All students admitted to the program receive a stipend and tuition support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends. While funds to support international students are limited, one special scholarship is available each year for a student from a developing, sub-Saharan African country. There is also a university-wide fellowship program that provides funding to qualified underrepresented minority students in the sciences.

Graduates ordinarily assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. Career opportunities in the biological sciences as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Courses Offered by the Division of Biological Sciences, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

DBS 205ab. Interdepartmental Seminar in the Biological Sciences (Wessling-Resnick, Nickoloff)
Presents current research by faculty members in the biological sciences, followed by discussions of the logic and experimental design of this research. Topics include carcinogenesis, DNA damage and repair, immunology, molecular biology, radiobiology, respiratory biology, and virology. (5 credits)

DBB 207cd. Statistical Methods in Biology (Catalano)
Familiarizes students with the statistical methods used in laboratory research for design of experiments and statistical analyses of hypotheses. Topics include theory of probability and statistics, analysis of data, ANOVA and multiple regression, and nonparametric methods. (5 credits)

DBE 208cd. Pathophysiology of Human Disease (Kobzik)
Surveys disease problems in the cardiovascular, respiratory, hematopoietic, reproductive, and gastrointestinal systems. Emphasizes the pathophysiology of disease manifestations, the pathogenesis of the disease process, and public health perspectives. (5 credits)

For application materials and information about admission to the PhD program, please contact the Admissions Office, Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Boston, MA 02115.
Phone: 617-432-0162
The deadline for application to the PhD program is December 15.

For application materials and information about admission to the SD program, please contact Carrie Daniels, Assistant Director of Admissions, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1031
Fax: 617-432-2009
E-mail: admisofc@sph.harvard.edu
The deadline for application to the SD program is January 2.

Applicants who have specific questions about the PhD program may contact Ruth Kenworthy, Administrator, Division of Biological Sciences, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4470
Fax: 617-430-0433
E-mail: kenworthy@cvlab.harvard.edu

Faculty

Director, Division of Biological Sciences: Edgar Haber, MD, Elkan R. Blout Professor of Biological Sciences, Harvard School of Public Health, and Professor of Medicine, Harvard Medical School

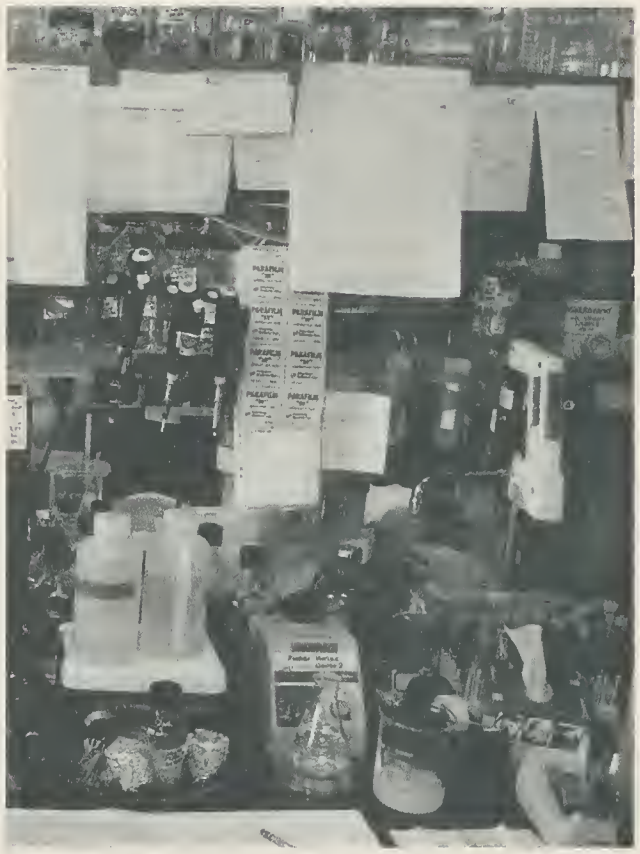
Program Director, Committee on Biological Sciences in Public Health: Dyann F. Wirth, PhD, Professor of Tropical Public Health

Faculty from several HSPH departments, as well as from other parts of Harvard University, are affiliated with DBS and are listed below. Please refer to the index inside the back cover to locate the research interests of HSPH faculty. For others, please contact DBS.

Alberto Ascherio, MD, MPH, DPH
Robert B. Banzett, PhD
Stephen M. Beverley, PhD
Joseph D. Brain, SM, SM, SD
Harriet A. Burge, MA, PhD
Harold A. Chapman, Jr., MD
David C. Christiani, MD, SM, MPH
Alison Cullen, SM, SD
John R. David, MD

Faculty

Bruce Demple, PhD
Douglas W. Dockery, SM, SM, SD
Jeffrey M. Drazen, MD
Raymond L. Erickson, MS, PhD
Myron E. (Max) Essex, DVM, SM, PhD
John S. Evans, SM, SM, SD
Timothy E. Ford, PhD
Jeffrey J. Fredberg, SMME, ME, PhD
Laurie H. Glimcher, MD
John J. Godleski, MD
Peter Goldman, AM, MD
Rose H. Goldman, MD, MPH, SM
Ellen M. Gravallese, MD
Gareth M. Green, MD
Michael J. Grusby, PhD
Donald A. Harn, Jr., AM, PhD
Joseph J. Harrington, AM, PhD
J. Woodland Hastings, AM, PhD, AM
M. Guillermo Herrera-Acena, MD
Robert F. Herrick, MS, SD
Martin S. Hirsch, MD
Howard Hu, MD, MPH, SM, DPH
Phyllis J. Kanki, DVM, SD
Karl T. Kelsey, MD, MOH
David M. Knipe, PhD
Lester Kobzik, MD
Petros Koutrakis, MS, PhD
(Arthur) Mu En Lee, BM, PhD
Tun-Hou Lee, SM, SD
Howard L. Liber, PhD
John B. Little, MD
Stephen H. Loring, BMS, MD
John E. Maggio, AM, PhD
James H. Maguire, MD, MPH
Donald K. Milton, MD, MPH, DPH
Richard R. Monson, MD, SM, SD
Lucas M. Neas, MSE, SD
Jac A. Nickoloff, PhD
Bjorn R. Olsen, MD, PhD, AM
Joseph D. Paulauskis, MS, PhD
Karen E. Peterson, RD, SD
Willy F. Piessens, MD
Guy L. Reed III, MS, MD
Lorenz R. Rhomberg, PhD
Eric B. Rimm, SD
Stephen N. Rudnick, MS, SM, SD
Mary E. Russell, MD
P. Barry Ryan, SM, PhD
Frank M. Sacks, MD
Leona D. Samson, PhD
John C. Samuelson, MD, PhD
Robert H. Schiestl, PhD
Robert Schlegel, MPH, PhD
Joel D. Schwartz, PhD
Jacob Shapiro, SM, PhD
Steven A. Shea, PhD
Charles B. Shoemaker, PhD
Stephanie A. Shore, PhD
Thomas J. Smith, MPH, MS, PhD
Stover H. Snook, AM, PhD
Joseph G. Sodroski, MD
Frank E. Speizer, MD
John D. Spengler, PhD, SM
Bruce M. Spiegelman, PhD
Andrew Spielman, SD
Meir J. Stampfer, MD, MPH, DPH
Armen H. Tashjian, Jr., MD
W. Allan Walker, MD
Ning Wang, MS, SD
Angeline E. Warner, MS, DVM, SD
Marianne Wessling-Resnick, MS, PhD
Walter C. Willett, MD, MPH, DPH
Xiping Xu, MD, PhD, SM
Yukio Yanagisawa, MEng, DEng



DBS 225cd. Applied Molecular Biology (Shoemaker)
Covers the theoretical and practical aspects underlying molecular biology technologies. Focuses on ways that different procedures can work together to solve research problems, possible shortcuts, and pitfalls to avoid. (2.5 credits) Offered 1995-96 and alternate years.

DBS 231abcd. Interdisciplinary Seminar in Cardiovascular Disease Prevention (Haber, Willett, Kawachi)
Covers research in cardiovascular biology, epidemiology, health policy, and social behavior. (5 credits) Not offered 1995-96.

Tutorial Programs, Laboratory Rotations
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or to undertake specialized readings or studies. Offers hands-on experimental methods of research in the biological sciences and includes individual original laboratory work, assigned readings, and participation in seminars and journal clubs.

The Division of Biological Sciences offers interdisciplinary training, with students taking courses in several different departments to meet their individual requirements. All students complete core course requirements and elective courses during their first two years of study. In addition to core courses in biochemistry, cell biology, genetics, microbiology, and physiology (offered through the Division of Medical Sciences), students take one or more of the following elective courses, which are described in the departmental listings of this *Official Register*.

CB 204ab. Immunobiology

CB 207ab. Radiation Biology

CB 212ab. Introduction to Cancer Biology

EH 205ab. Human Physiology

EH 223ab. Advanced Respiratory Physiology

NUT 202cd. The Science of Human Nutrition

TOE 204ab. Principles of Toxicology

TOX 225cd. Genetic Toxicology

TOX 250cd. Molecular and Cellular Toxicology

TPH 208cd. Immunology of Parasitic Infection

TPH 216cd. Cellular and Molecular Biology of Parasites

DEPARTMENT OF BIOSTATISTICS

The goal of the Department of Biostatistics is to contribute to the theory and practice of statistical science as it is applied to the biomedical and health sciences. The department strives to accomplish this goal by developing and implementing statistical methods for research in public health and by training students for careers in the fields of biostatistics and health decision sciences.

Cheryl Jones
SD/Biostatistics

"In public health there are always new challenges, and there is a need for reliable methods to analyze data and evaluate programs and therapies. That's what I would like to do—help develop methods of analysis," says Cheryl, who recently completed her first year of doctoral study in biostatistics. "I was a statistics major in college, but I wasn't sure what to study in graduate school. Then I read a course catalog that described the research work of biostatistics facuity; much of the work was related to health. Here was a way that I could keep my focus on statistics while learning how to help people with that knowledge."

After completing her master's degree at the University of Washington, Cheryl enrolled in HSPH. "The school has a strong program in longitudinal data analysis and offers weekly seminars and working groups in biostatistics. The combination of good teaching and personal interaction is wonderful." During the summer, Cheryl will evaluate an AIDS clinical trial database, examining factors and variables that affect quality of life for patients.

The programs offered by the Department of Biostatistics provide rigorous training in the development of methodology, collaboration, teaching, and consulting on a broad spectrum of health-related problems. The faculty includes leaders in the development of statistical methods for clinical trials and observational studies, studies on the environment, animal experiments, and longitudinal studies. Members of the department lead large multidisciplinary projects and serve on many national and international advisory committees. The department's research in statistical methods and its interdisciplinary collaborations provide many opportunities for student participation.

Current departmental research includes the development of statistical and computing methods for clinical trials, including survival and sequential analysis methodology; environmental and epidemiologic research; collaborative clinical research in the treatment of cancer and AIDS; quantitative problems in health risk analysis, technology assessment, and clinical decision making; statistical methodology in psychiatric research and collaborative research in mental health; and collaborative research activities with biomedical scientists at the Harvard Medical School and affiliated hospitals.

Applicants to the department should have successfully completed calculus through multivariable integration and at least one semester of linear algebra. Knowledge of a programming language such as FORTRAN or C is required, and introductory courses in probability and statistics and practical knowledge of a statistical computing package such as SAS, BMDP, or SPSS are desirable. From time to time the department will admit students without this level of preparation with the understanding that the student will promptly make up any deficiencies, usually by taking additional courses prior to entering the program.

For more information about degree programs in Biostatistics, or about any other aspect of the department, please contact Ellen Fredberg, Administrator, Department of Biostatistics, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1056
Fax: 617-739-1781
E-mail: dept@hsph.harvard.edu

For more information about degree programs in Health Decision Sciences, please contact Milton Weinstein, PhD, Department of Biostatistics, 718 Huntington Avenue, Boston, MA 02115
Phone: 617-432-0805
E-mail: mcw@hsph.harvard.edu

The Department of Biostatistics offers postdoctoral fellowships for biostatistical training in the areas of AIDS, cancer, and environmental health. In a joint program with the Department of Epidemiology, the department also offers doctoral and postdoctoral training in epidemiologic and statistical methods as arising in the study of psychiatric disorders. Funded by the National Institute of Mental Health or the National Institutes of Health, these fellowships may be awarded only to US citizens or permanent residents. Candidates for postdoctoral fellowships must have a doctoral degree in biostatistics, statistics, or a related discipline. For more information, please contact the Chair of the Postdoctoral Committee, Department of Biostatistics, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1056
Fax: 617-739-1781
E-mail: smillen@hsph.harvard.edu

Limited funding may be available for some students through four biostatistics training grants (in AIDS, cancer, the environment, and mental health) and one health decision sciences training grant (in medical informatics). Traineeships and assistantships are awarded on a competitive basis to qualified applicants.

Recent graduates have assumed faculty posts at universities and schools of public health, as well as positions in research laboratories and centers in the federal government, in pharmaceutical companies, and in research institutes.

As described below, the department offers both a four-semester and a two-semester Master of Science (SM) program and a Doctor of Science (SD) program in Biostatistics, as well as a four-semester SM program and an SD program with a concentration in Health Decision Sciences. Please refer to page 8 for information about the Master of Public Health concentration in Quantitative Methods. Detailed information about requirements and elective options can be found in a handbook distributed by the department.

Master of Science in Biostatistics (four-semester program)

Biostatistics The main emphasis of the four-semester SM program in Biostatistics is to prepare students for doctoral study, although a limited number of qualified students may pursue the master's degree only.

Of the 80 credits necessary to earn the four-semester SM, 2.5 credits must be used to fulfill the school-wide epidemiology requirement (EPI 200a or EPI 201a), and 25 credits must be earned in the following core courses: BIO 221cd, *Discrete Multivariate Analysis;* BIO 230ab, *Probability Theory and Applications;* BIO 231cd, *Statistical Inference I;* BIO 235ab, *Regression and Analysis of Variance;* and BIO 236ab, *Analysis of Failure Time Data.* An additional 15 credits must be chosen from biostatistics and epidemiology courses at the level of BIO 210cd or higher (but below 300), of which 10 credits must be chosen from a specific list of biostatistics, health policy and management, and interdisciplinary offerings. In addition to formal course work, students acquire experience in the planning of experiments and the analysis of data by participating in the consulting seminar (BIO 312). Students also choose from a variety of elective courses.

Health Decision Sciences The program in Health Decision Sciences offers integrated educational training in decision sciences within the context of health problems. The program is jointly offered by the Departments of Biostatistics and Health Policy and Management. All students must be admitted to the master's program in one department or the other, and degrees are offered through one department or the other.

Of the 80 credits necessary to earn the SM, 2.5 credits must be used to fulfill the school-wide epidemiology requirement (EPI 200a or EPI 201a), and students must complete the following core courses: HPB 280b, *Decision Analysis for Health and Medical Practices,* or HPM 286s, *Decision Analysis in Clinical Research;* HPB 281c, *Clinical Decision Analysis;* HPE 284a, *Decision Theory;* BIO 230ab, *Probability Theory and Applications;* BIO 231cd, *Statistical Inference I;* and preparation in computing. Fifteen additional credits must be earned from the Health Decision Sciences core and extended core (see list under SD program), along with at least 10 additional credits in biostatistics. The consulting requirement (BIO 312) may be met by obtaining practical experience under the tutelage of a faculty member. Students also choose from a variety of elective courses.

Master of Science in Biostatistics (two-semester program)

Like the four-semester SM program, the main emphasis of the two-semester program with a concentration in Biostatistics is the preparation of students for doctoral study. The program is designed for students who have a master's degree in one of the mathematical sciences or a doctorate in a quantitative field. Applicants must have a mathematical and statistical background sufficient to achieve a level of proficiency after one year of study comparable to that achieved in the four-semester program. Since completion of the program in one year requires that courses be taken out of sequence, considerable background in probability and statistical inference is needed.

One of the chief research interests of Assistant Professor Paige Williams (right) is the development of statistical methodologies for environmental risk assessment.

The requirements for the two-semester SM are essentially the same as for the four-semester program. The 25-credit core must be completed, although students who have taken equivalent course work elsewhere may petition to substitute more advanced courses. Greater flexibility is allowed in the other requirements, since only 40 total credits are required. Other courses are selected in consultation with a faculty advisor to complement and extend the student's previous training in biostatistics.

The department does not offer a two-semester program in Health Decision Sciences.

Doctor of Science in Biostatistics

Biostatistics The doctoral program in Biostatistics is designed for those who have demonstrated both interest and ability in scholarly research. Qualified applicants may apply directly to the doctoral program without a prior advanced degree. Candidates must complete a minimum of two academic years of full-time study in residence at HSPH, pass the written departmental comprehensive examination and the school-wide oral qualifying examination, and complete, defend, and submit a thesis.

Beyond the school-wide requirement of introductory epidemiology (EPI 200a or EPI 201a), the course work for the program is built on a 30-credit core curriculum which includes BIO 221cd, *Discrete Multivariate Analysis;* BIO 230ab, *Probability Theory and Applications;* BIO 231cd, *Statistical Inference I;* BIO 235ab, *Regression and Analysis of Variance;* BIO 236ab, *Analysis of Failure Time Data;* and BIO 251cd, *Statistical Inference II.* In addition, 20 credits of biostatistics courses at the 210 level or higher (but below 300) are required; these courses are chosen by the student in consultation with an advisor. Students must also complete two minors (10 credits each), only one of which may be quantitative (such as theoretical statistics, biomedical computing, or health decision sciences) while the other must be substantive (such as epidemiology).

Doctoral students are required to participate as a teaching assistant in a course offered by the department. In order to acquire experience in the planning of experiments and the analysis of data, students must take the consulting seminar (BIO 312) or complete an outside project approved by the seminar director.

Faculty

Department Chair: Nan M. Laird, PhD (Harvard University); Henry Pickering Walcott Professor of Biostatistics. Longitudinal studies; non-response and missing data methods; discrete data analysis. (On leave 1995-96)

Acting Department Chair (1995-96): Marcello Pagano, SM (University of Florida), PhD (Johns Hopkins University); Professor of Statistical Computing. Statistical computing; clinical trials; epidemic modeling.

Rebecca A. Betensky, PhD (Stanford University); Assistant Professor of Biostatistics. Sequential analysis; correlated binary data.

Paul J. Catalano, SD (Harvard University); Assistant Professor of Biostatistics. Repeated measures; multivariate models; dose-response modeling.

Mary K. Cowles, MMus (Northwestern University), MS, PhD (University of Minnesota); Assistant Professor of Biostatistics. Markov chain Monte Carlo methods; computation of theoretical convergence bounds.

Marie Davidian, MS (University of Virginia), PhD (University of North Carolina); Associate Professor of Biostatistics. Nonlinear mixed effects models methodology; variance function estimation.

Victor G. DeGruttola, SM, SM, SD (Harvard University); Associate Professor of Biostatistics. Methods for analysis of repeated measures from longitudinal studies; methods for epidemiological analysis of AIDS.

Diane L. Fairclough, MS (Virginia Polytechnic Institute), MSPH, DrPH (University of North Carolina); Lecturer on Biostatistics. Analysis of repeated measures with randomly and nonrandomly missing data.

Robert J. Gray, SM, PhD (Oregon State University); Senior Lecturer on Biostatistics. Clinical trials; survival analysis; techniques for exploratory data analysis and model building.

David P. Harrington, AM, PhD (University of Maryland); Professor of Biostatistics. Nonparametric methods for censored data; sequential designs for clinical trials; data smoothing techniques for regression methods.

Faculty

Michael D. Hughes, MSc, PhD (London University); Associate Professor of Biostatistics. Statistical methods in the design, analysis, and reporting of clinical trials and overviews; repeated measures data.

Joseph G. Ibrahim, MS, PhD (University of Minnesota); Assistant Professor of Biostatistics. Generalized linear models; Bayesian inferences; model selections; incomplete data problems.

Stephen W. Lagakos, MPhil, PhD (George Washington University); Professor of Biostatistics. Statistical methods in AIDS research; clinical trials; carcinogenicity experiments.

Stuart R. Lipsitz, MS (University of North Carolina), SD (Harvard University); Associate Professor of Biostatistics. Resampling methods; categorical data; longitudinal data; missing data.

Ian C. Marschner, PhD (La Trobe University, Australia); Assistant Professor of Biostatistics. Statistical methodology for the HIV/AIDS epidemic; disease prevalence surveys; application of the Em-algorithm to epidemiology.

Donna S. Neuberg, MA (University of Chicago), MA (State University of New York, Stony Brook), SD (Harvard University); Assistant Professor of Biostatistics. Cancer clinical trials; genetic epidemiology.

Kathleen J. Propert, SM, SD (Harvard University); Assistant Professor of Biostatistics. Applications of smoothing and longitudinal data methods to analysis of clinical trials.

James M. Robins, MD (Washington University); Professor of Epidemiology and Biostatistics. Development of analytic methods for drawing causal inferences from complex observational and randomized studies with time-varying exposures or treatments.

Andrea G. Rotnitzky, MA, PhD (University of California, Berkeley); Associate Professor of Biostatistics. Longitudinal data analysis; analysis of repeated categorical data and cluster correlated data; statistical methods in environmental health.

Louise M. Ryan, PhD (Harvard University); Professor of Biostatistics. Rodent tumorigenicity experiments; teratology experiments; clinical trials.

Health Decision Sciences The doctoral program in Health Decision Sciences offers integrated educational training in decision analysis, cost-benefit and cost-effectiveness analysis, behavioral decision theory, operations research, applied welfare economics, statistical inference, computer science, and biostatistics, all within the context of health problems. This program is coordinated with, but distinct from, the decision sciences track in the PhD Program in Health Policy, described under Health Policy and Management (see page 51).

Candidates must complete a minimum of two academic years of full-time study in residence at HSPH, pass the written departmental comprehensive examination and the school-wide oral qualifying examination, and complete, defend, and submit a thesis. The program requires 50 credits of course work in the major field, plus 10 credits in each of two minor fields, one of which must be biostatistics. Health policy and management is acceptable for the other minor, provided the courses focus on subject-oriented rather than quantitative material.

The course work includes the school-wide requirement of introductory epidemiology (EPI 200a or EPI 201a); BIO 230ab, *Probability Theory and Applications;* BIO 231cd, *Statistical Inference I;* 20 credits from the health decision sciences core; and 20 credits from the extended core. The core includes the following courses: HPB 280b, *Decision Analysis for Health and Medical Practices;* HPB 281c, *Clinical Decision Analysis;* HPB 282d, *Cost-Effectiveness and Cost-Benefit Analysis for Health Program Evaluation;* and HPE 284a, *Decision Theory.* For a list of extended core options, see the department's student handbook.

All doctoral students are required to participate as a teaching assistant in a course offered by the department. In order to acquire experience in decision analysis, students must take the consulting seminar (BIO 312) or complete an outside project approved by the seminar director.

Courses Offered by the Department of Biostatistics, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

BIO 112a. Computing Principles and Methods I (Pagano)
Provides basic computer literacy to students from all disciplines. Topics include computer architecture and terminology; organization, capabilities, and limitations of computers; programming principles; database management; telecommunications; and data analysis software. (2.5 credits)

BIO 113. Introduction to SAS (Pagano, Fenton, Allred)
BIO 113b. (2.5 credits)
BIO 113e. (1.25 credits)
BIO 113t. (2.5 credits)
Provides instruction in the use of SAS for statistical analysis, database management, and computer programming. Discusses basic issues in each of these areas in the context of teaching specific skills required to use SAS effectively.

BIO 114c. C-Programming (Pagano, el Lozy)
Prepares students to write programs in C. Covers variable definitions and data types, arithmetic expressions, program looping and if-statements, single and multidimensional arrays, functions, use of standard libraries, structures, pointers, and strings. (2.5 credits)

BIO 200ab. Introduction to Statistical Methods (Pagano, Gauvreau)
Covers basic statistical techniques for analyzing data from epidemiology, environmental health, biomedical, and other relevant research. Topics include probability, estimation and inference, distribution-free methods, contingency tables, regression analysis, analysis of variance, and study design. (5 credits)

BIO 201ab. Principles of Biostatistics (Pagano)
Acquaints students with the basic concepts of biostatistics and their applications and interpretation. Topics include descriptive statistics, graphics, diagnostic tests, probability distributions, inference, tests of significance, association, linear and logistic regression, and life tables. (5 credits)

BIO 201s. Principles of Biostatistics (Testa)
Presents the first part of introductory biostatistics, covering data presentation, numerical summary measures, rates and standardization, life tables, and sampling distributions. Introduces probability to quantify uncertainty. (2.5 credits)

BIO 201t. Principles of Biostatistics (Richardson)
Presents the second part of introductory biostatistics, exploring inference in greater depth and emphasizing data analysis. Other topics include comparison of two means, analysis of variance, nonparametric methods, inference on proportions, contingency tables, and simple regression. (2.5 credits)

BIO 206st. Statistical Principles in Medical Research (Orav)
Includes concepts in probability and statistics, hypothesis testing, non-parametrics, discrete data analysis, regression and analysis of variance. Emphasizes the design and analysis of clinical studies. Designed primarily for participants in the Program in Clinical Effectiveness. (5 credits)

BIO 210cd. The Analysis of Rates and Proportions (Testa)
Emphasizes concepts and methods for analysis of data which are categorical, rate-of-occurrence, and time-to-event. Stresses applications in epidemiology, clinical trials, and other public health research. (5 credits)

BIO 211cd. Regression and Analysis of Variance in Experimental Research (Marschner)
Covers analysis of variance and regression, including details of data-analytic techniques and implications for study design. Also included are probability models and computing, and the formulation of scientific questions in terms of statistical models. (5 credits)

BIO 212cd. Survey Research Methods in Community Health (Laird, Mangione)
Covers research design, sample selection, questionnaire construction, interviewing techniques, reduction and interpretation of data, and related facets of population survey investigations. Focuses on applying survey methods to problems of health program planning and evaluation. (2.5 credits)

BIO 213ab. Applied Regression for Clinical Research (Orav)
Introduces students involved with clinical research to the practical application of multiple regression analysis. Covers linear regression, logistic regression, and proportional hazards survival models, as well as general concepts in model selection, goodness-of-fit, and testing procedures. (5 credits)

BIO 214. Principles of Clinical Trials
BIO 214c. (Hughes)
BIO 214t. (Gelber, Stanley)
Covers types of clinical research, study design, treatment allocation, randomization and stratification, quality control, sample size requirements, patient consent, and interpretation of results, focusing on the scientific, policy, and management aspects of clinical trials. (2.5 credits)

BIO 215ab. Basics of Statistical Inference (D. Harrington)
Introduces probability theory and mathematical statistics underlying techniques in public health research. Topics include probability distributions, means, variances and expected values, finite sampling distributions, parameter estimation, confidence intervals, and hypothesis testing. Designed for doctoral students not concentrating in Biostatistics. (2.5 credits)

BIO 216cd. Applied Survival Analysis (Betensky)
Covers such topics as parametric distributions, hazard and survivorship functions, estimation of survival distributions, two-population problems, proportional hazard models, accelerated failure time models, tests of proportional hazard assumption, time varying covariates, and useful software. (5 credits)

BIO 216t. Survival Methods in Clinical Research (Davis)
Covers common approaches to display and analysis of survival data, including Kaplan-Meier curves, log rank tests, and Cox proportional hazards regression. Emphasizes concepts, model-building, and checking. (2.5 credits)

BIO 218ab. Applied Multivariate Analysis (J.H. Ware)
Introduces basic statistical techniques for the analysis of multivariate data, with emphasis on repeated measures, clustered and longitudinal data. Topics include correlated data, repeated measures ANOVA, random effects and growth curve models, and generalized linear models with correlated responses. (5 credits)

BIH 219c. Multiple Regression Analysis for Health Policy and Management (Fairclough)
Covers the application and interpretation of multiple regression models in the context of health policy and management research, with an emphasis on multiple linear regression, including ANOVA, with introductions to logistic and Cox regression. (2.5 credits)

BIO 220ab. Introduction to Statistical Modeling and Data Analysis (Propert)
Covers such topics as parametric and non-parametric methods for continuous outcomes, linear rank tests, correlation, ANOVA, linear regression, basic design of experiments, and methods of exploratory data analysis and robust estimation. Designed for first-year Biostatistics degree candidates. (5 credits)

BIO 221cd. Discrete Multivariate Analysis (Williams)
Focuses on the use of statistical models for analyzing count data, emphasizing both practical application and theory. Topics include the analysis of contingency tables, chi-square and exact tests, measures of association, logistic regression, and log linear analysis. (5 credits)

Faculty

Donna L. Spiegelman, SM, SD (Harvard University); Associate Professor of Epidemiology and Biostatistics. Binary data models with measurement error and misclassification in model covariates; design of studies with such data features; applications of biostatistics to epidemiology, particularly nutritional, occupational, and environmental data problems.

Catherine A. Spino, SM, SD (Harvard University); Assistant Professor of Biostatistics. Statistical computing; exact tests; AIDS clinical trials. (On leave 1995-96)

Kenneth E. Stanley, MA (Bucknell University), PhD (University of Florida); Lecturer on Biostatistics. Estimating mortality attributable to tobacco in the presence of incomplete information; analysis of tobacco control policies.

Marcia A. Testa, MPH, MPhil, PhD (Yale University); Lecturer on Biostatistics. Design, methodology, measurement, and analytical techniques for evaluation of quality of life indices in therapeutic clinical trials; design and structure of clinical database information management systems.

Anastasios A. Tsiatis, PhD (University of California, Berkeley); Professor of Biostatistics. Survival analysis; early stopping of clinical trials; statistical methods in epidemiology.

James H. Ware, PhD (Stanford University); Frederick Mosteller Professor of Biostatistics and Dean for Academic Affairs. Design and analysis of longitudinal studies; statistical aspects of environmental health research; design and analysis of clinical trials.

Lee-Jen Wei, PhD (University of Wisconsin); Professor of Biostatistics. Design and analysis of clinical trials; repeated measurements analysis; survival analysis.

Milton C. Weinstein, AM, MPP, PhD (Harvard University); Henry J. Kaiser Professor of Health Policy and Management (Health Policy and Management and Biostatistics); Professor of Medicine, Harvard Medical School. Cost-effectiveness of health practices and technologies.

Paige L. Williams, MS, PhD (University of North Carolina); Assistant Professor of Biostatistics. Cancer risk assessment and other areas of environmental statistics, especially animal carcinogenicity bioassays; development of statistical methodology for survival analysis.

Faculty

David Wypij, ScM (Brown University), MS, PhD (Cornell University); Associate Professor of Biostatistics. Longitudinal data analysis; repeated measures and growth curve models; discrete data; correlated, matched, and longitudinal binary data; statistical computing.

Grace Wyshak, SM (Harvard University), PhD (Yale University); Lecturer on Demography and Biostatistics (Population and International Health and Biostatistics). Biostatistical and demographic methods; women's reproductive health.

Marvin Zelen, AM (University of North Carolina), PhD (American University); Professor of Statistical Science; Member of the Faculty of Arts and Sciences. Theory and practice of clinical trials; methodology for early detection of disease; probabilistic modeling of biomedical phenomena.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School.

Roger B. Davis, MA (University of Rochester), SD (Harvard University); Assistant Professor in the Department of Biostatistics. Design and analysis of clinical trials; recursive partitioning methods; exploratory analyses of databases to develop prognostic classification systems; survival analysis.

Dianne M. Finkelstein, AM (Wayne State University), PhD (University of Michigan); Associate Professor in the Department of Biostatistics. Carcinogenicity experiments; survival analysis; statistical methods for AIDS clinical trials and epidemiology.

Richard D. Gelber, SM (Stanford University), PhD (Cornell University); Professor in the Department of Biostatistics. Design and analysis of clinical trials; quality of life endpoints for clinical trials; statistical education of medical professionals; application and interpretation of meta-analyses; evaluation of therapeutic trials in pediatric oncology, breast cancer, and pediatric AIDS. (On leave through January 1996)

Rebecca S. Gelman, PhD (State University of New York at Buffalo); Associate Professor in the Department of Biostatistics. Clinical trials; disease screening; survival methods; breast cancer; AIDS-related immunology; radiation oncology; laboratory quality control.

Faculty members in the Department of Biostatistics are consistently cited by students for the excellence of their teaching. Winners of the 1994 teaching awards are, from left to right, Chung-Cheng Hsieh, David Wypij, David Harrington, Marcello Pagano, John Orav, and teaching assistant Constantine Daskalakis. All but Hsieh and Daskalakis, who teach in the Department of Epidemiology, are members of the Department of Biostatistics.

BIO 230ab. Probability Theory and Applications (Zelen)
Covers such topics as axiomatic foundations, frequency and personal concepts of probability, combinatorics, discrete and continuous sample spaces, independence and conditional probability, random variables, expectation operator, moments, standard distributions, transformations, and convergence concepts. (5 credits)

BIO 231cd. Statistical Inference I (Lagakos)
Discusses principles of data reduction, describes methods of point and interval parameter estimation and the small and large sample properties of estimators, and covers methods of hypothesis testing and optimality properties of tests. (5 credits)

BIO 235ab. Regression and Analysis of Variance (Ibrahim)
Describes procedures of estimation and hypothesis testing for linear models; discusses techniques of analysis of variance and experimental design. (5 credits)

BIO 236ab. Analysis of Failure Time Data (Wei)
Discusses the theoretical basis of concepts and methodologies associated with survival data and censoring, nonparametric tests, and competing risk models. Much of the theory is developed using counting processes and martingale methods. (5 credits)

BIO 245cd. Analysis of Multivariate and Longitudinal Data (Rotnitzky, DeGruttola)
Presents classical and modern approaches to the analysis of multivariate observations, repeated measures, and longitudinal data; discusses computational issues for traditional and new methodologies. (5 credits)

BIO 246cd. Generalized Linear Models
Focuses on generalized linear models, nonlinear models, models with generalized variance structure, iteratively reweighted least squares estimation methods, and effects of model misspecification and robustness. (5 credits) Not offered 1995-96.

BIO 247cd. Design of Scientific Investigations
Covers aspects of statistical theory and practice relevant to the design of health-related scientific investigations. Topics include sample size considerations, basic principles of experimental design, longitudinal studies, and sample surveys. (5 credits) Not offered 1995-96.

BIO 248cd. Advanced Statistical Computing (Gray)
Presents computing algorithms useful in statistical research and advanced applications. Topics include computer arithmetic, matrix algebra, spline smoothing and penalized likelihood, numerical integration, and random number generation and simulation methods. (5 credits)

BIO 251cd. Statistical Inference II (Tsiatis)
Considers asymptotic theory and theories of optimality. Topics include limit theorems, multivariate delta method, semi-parametric efficient estimation, asymptotic relative efficiency, hypothesis tests, invariance, minimaxity, and Bayesian inference. (5 credits)

BIO 261cd. Causal Inference
Focuses on methods for analyzing the causal association of an exposure variable and a health outcome variable using data from epidemiological or randomized studies. (2.5 credits) Not offered 1995-96.

BIO 262cd. Statistical Problems in Drug Development
Introduces applications of statistical methodology required for the various phases of pharmaceutical drug development; features guest lecturers from the pharmaceutical industry. (2.5 credits) Not offered 1995-96.

BIO 263ab. Exact Nonparametric Inference
Studies nonparametric and semi-parametric statistical methods of inference for a variety of problem types, with an emphasis on the development of efficient numerical algorithms for exact and Monte Carlo inference. (2.5 credits) Not offered 1995-96.

BIO 264ab. Bayesian Methodology in Biostatistics
Introduces the fundamentals of Bayesian inference, recent advances in computational approaches, and application of Bayesian methods to areas of biostatistics including the design and analysis of clinical trials, meta-analysis, diagnostic test evaluation, and health services research. (5 credits) Not offered 1995-96.

BIO 265ab. Nonlinear Repeated Measurement Models (Davidian)
Covers recent methodological developments for nonlinear modeling of data consisting of repeated measurements on each of a number of individuals, including parametric, nonparametric, semiparametric, and Bayesian approaches. (5 credits)

BIO 266d. Design and Analysis of Animal Bioassay (Catalano, L. Ryan, Williams)
Provides a foundation for methodologic research in bioassay design and analysis. Emphasizes statistical issues in rodent carcinogenicity, developmental toxicity, and neurotoxicity bioassays. (2.5 credits)

BIO 267ab. Sequential Methods for Clinical Trials
Introduces sequential methods in statistical analysis and their applications in biomedical research to clinical trials and bioassay. (2.5 credits) Not offered 1995-96.

BIO 268ab. Statistical Methods in Human Genetics (Neuberg)
Introduces statistical procedures for investigating the inheritance of human characteristics through studies of families and populations. (2.5 credits) Offered 1995-96 and alternate years.

BIO 269cd. Statistical Methods in Psychiatry
Covers assessment of inter-rater reliability, analysis of repeated measures experiments, methods for handling dropouts and missing data, measurement error models, ROC curves, and methods of segregation and linkage analyses. (2.5 credits) Not offered 1995-96.

BIO 270ab. Statistical Science Outreach (Zelen, Wei)
Aims to broaden the background of students in probability and statistics. Students give short presentations from expository articles and papers chosen on the basis of ideas rather than technical content. (2.5 credits)

BIO 271ab. Statistical Computing Environments (Kim)
Acquaints students with modern computing environments in the field of biostatistics. Topics include algorithmic and symbolic mathematics, source language programming and its tools, editors, typesetters, internet tools, and Unix. (2.5 credits)

Tutorial Programs
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or undertake special projects in the following areas: statistical methods; teaching of biostatistics; consultation; study design; and data analysis.

Faculty

Robert J. Glynn, MA (Boston College), PhD (Brandeis University), SM, SD (Harvard University); Associate Professor in the Department of Biostatistics. Analysis of longitudinal data; nonresponse in sample surveys; epidemiology of eye diseases; longitudinal studies of aging; compliance in clinical trials.

Robert A. Greenes, MD, PhD (Harvard University); Associate Professor in the Department of Biostatistics. Medical informatics; design and development of a modular approach to knowledge management; facilitating integration of the work of multiple contributors.

Mei-Ling Ting Lee, MS (National Tsing-Hua University), MA, PhD (University of Pittsburgh); Assistant Professor in the Department of Biostatistics. Lifetime data analysis; categorical data analysis; applied probability and statistical models in biosciences.

Sharon-Lise T. Normand, MSc (University of Western Ontario), PhD (University of Toronto); Assistant Professor in the Department of Biostatistics. Bayesian inference; graphical models; meta-analysis.

E. John Orav, PhD (Stanford University); Associate Professor in the Department of Biostatistics. Statistical computing and simulation; stochastic modeling; bioassay; clinical trials and data analysis.

Bernard A. Rosner, MA (Stanford University), PhD (Harvard University); Professor in the Department of Biostatistics. Analysis of clustered binary data; longitudinal data analysis; effect of measurement error on inferences in epidemiologic studies; methodologic problems in hypertension screening and evaluation.

David A. Schoenfeld, AM, PhD (University of Oregon); Associate Professor in the Department of Biostatistics. Statistics in medical research; linear models; bioassay; survival theory.

Adjunct Faculty

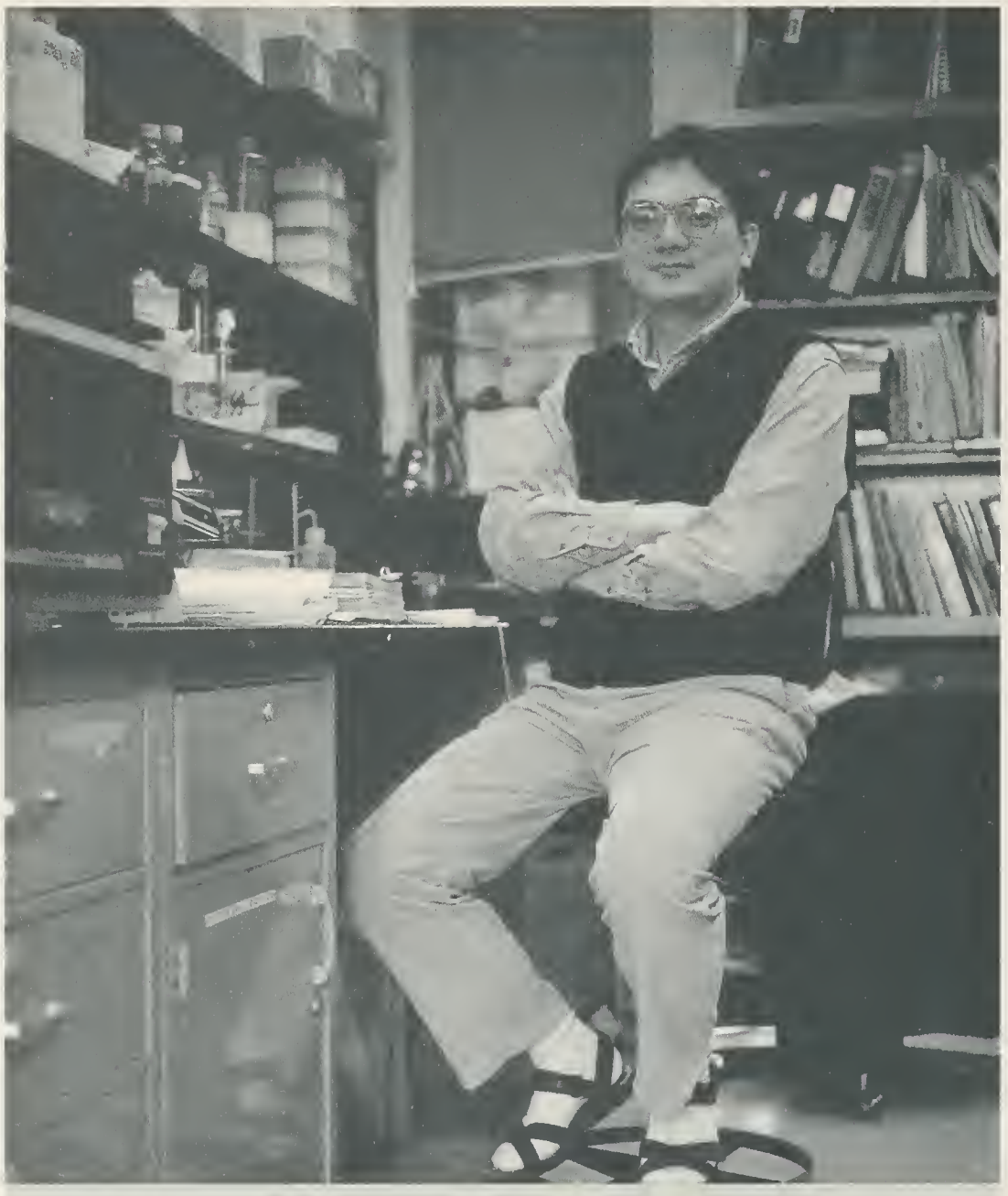
Constantine A. Gatsonis, MS, PhD; Associate Professor, Department of Community Health, Brown University.

Cyrus R. Mehta, SM, PhD; President, Cytel Software Corporation.

DeJuran Richardson, MS, PhD; Associate Professor of Mathematics, Lake Forest College.

DEPARTMENT OF CANCER BIOLOGY

Faculty in the Department of Cancer Biology are primarily involved in research into the causes of cancer, though substantial attention is also given to the study of AIDS and other retroviral diseases. Research programs emphasize cancer cell biology, viral oncology, and chemical and physical carcinogenesis; epidemiology, biology, and vaccinology of AIDS, hepatitis, and retrovirus-induced leukemias and neurological diseases; and genetic regulation of the immune response, molecular mechanisms of regulation of class II genes, and the function and regulation of T-cell-derived cytokines.



Kuan-Sheng Chou
SD/Cancer Biology

"During my medical residency in pediatrics I met a lot of sick children who had leukemia and other cancers. I decided I wanted to learn about the origins of cancer so I could help these children," remembers Kuan-Sheng, a physician from Taipei, Taiwan, ROC. He noticed the work of HSPH faculty member Max Essex on human HTLV retroviruses and the Department of Cancer Biology's advances in the fields of gene therapy and virology.

"I felt that coming to HSPH was a good opportunity to learn the similarities between the mechanisms of viruses and certain cancers," he says. "There are also several other schools nearby that offer seminars covering the most advanced knowledge in biology and other fields. This is almost impossible to find in Taiwan." After completing his program Kuan-Sheng plans to return to Taiwan as a faculty member and researcher in pediatrics and oncology at a new national children's hospital.

Investigations under way in the Department of Cancer Biology include the role of viruses in the cause of cancer; RNA tumor viruses as causes of leukemia, lymphomas, other tumors, and immunosuppressive disorders of animals and humans; pathogenesis of AIDS and characterization of the family of retroviruses associated with this disease; gene regulation and genetic events associated with the induction of leukemia and immunosuppressive disease; activation of proto-oncogenes and loss of tumor suppressors in carcinogenesis; cytogenetic effects of physical and chemical carcinogens, induction of mutations, and malignant transformation in mammalian cells by low and high LET radiations and chemical agents; mechanisms of mutagenesis and DNA recombination; and precise changes in DNA sequences produced by radiation and chemical carcinogens.

As described below, the department offers two doctoral programs. The program leading to the Doctor of Science (SD) degree is designed for candidates holding a clinical degree (MD, DVM, DMD). The Doctor of Philosophy (PhD) program is designed for all other candidates, who enter through the Biological Sciences in Public Health Program (a component of the Division of Medical Sciences, Graduate School of Arts and Sciences). Both programs feature concentrations in cancer cell biology, virology, and immunology.

Doctor of Science in Cancer Biology

The Doctor of Science (SD) program is designed to prepare students for postdoctoral research fellowships, junior faculty positions at academic institutions, and positions in independent research institutes, in governmental agencies, and in the biotechnical industry.

Applicants to the SD program must hold a clinical degree in either medicine, veterinary medicine, or dentistry. A background in biology,

molecular biology, medicine, or biochemistry is preferred. A limited number of training grant positions may be available to Cancer Biology students through governmental programs.

This program aims to develop the basic skills in laboratory techniques and data handling necessary for undertaking original research. Course work during the first one to two years emphasizes cancer biology, cellular and molecular biology, virology, immunology, radiation biology, and genetics. Required courses for all concentrations include school-wide requirements in epidemiology (EPI 200a or EPI 201a) and intermediate biostatistics (BIO 210cd or BIO 211cd), as well as appropriate courses for one major (20 credits) and two minor fields (10 credits each). Electives are chosen according to students' needs and interests. Courses may be taken at Harvard Medical School, the Graduate School of Arts and Sciences, and MIT, as well as at HSPH.

Students are encouraged to participate in the numerous seminar series and informal discussion groups offered on the Longwood campus. The department emphasizes publication of research results in the standard research literature, and most doctoral students publish several papers before completing the degree. Students must pass the school-wide oral qualifying examination and must complete, defend, and submit a thesis based on intensive laboratory research under the guidance of a faculty advisor in the student's area of concentration. The three main areas of concentration are as follows:

Cancer Cell Biology This concentration is designed for individuals who plan to hold positions in teaching or research that relate to cancer biology and prevention. The program emphasizes physical and chemical carcinogenesis as well as viral oncology. Students take courses in cancer biology, cell biology, and other relevant fields.

Virology This concentration is designed to train a future generation of experts for new developments in the pathogenesis and prevention of AIDS and other infectious diseases. At present the program emphasizes the epidemiology, biology, and vaccinology of AIDS as an example of a complex infectious disease, as well as hepatitis and retrovirus-induced leukemias and neurological diseases. Students take courses in virology, vaccine development, and related fields.

Immunology This concentration is designed for individuals who plan to hold positions in teaching or research in immunology. Graduates ordinarily assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. The program currently focuses on genetic regulation of the immune response, molecular mechanisms of the regulation of class II genes, and the function and regulation of T-cell-derived cytokines. Students take courses in cell biology, immunology, and molecular immunology.

Doctor of Philosophy in Biological Sciences in Public Health (BPH) (Cancer Biology)

Students wishing to study cellular and molecular biology or physiology as they pertain to major problems in public health should apply to the Biological Sciences in Public Health program. This program offers the PhD degree through Harvard University's Graduate School of Arts and Sciences, Division of Medical Sciences, Committee on Biological Sciences in Public Health.

The program offers a firm foundation in the basic biomedical sciences, as well as in epidemiology and biostatistics. Specific courses supplement this core, as dictated by individual research concentrations; students affiliated with the Department of Cancer Biology may choose to concentrate in cancer cell biology, immunology, or virology. Students in this program engage in laboratory rotations in three different research areas, to enable them to assess realistically their interests in a thesis project and to evaluate the suitability of the laboratory and the mentor. At the completion of these rotations, students select an area of concentration and a thesis research laboratory and complete the required curriculum. A qualifying examination must be passed before engaging in thesis work, and the thesis must be defended before the granting of the PhD. Some students also participate in the Harvard-Markey Biomedical Scientist Training Program, a new pathway of graduate education designed to offer PhD students a greater knowledge of human biology and disease.

Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics,

For more information about the SD program in Cancer Biology or about any other aspect of the department, please contact Jacqueline G. Breen, Associate Coordinator, Department of Cancer Biology, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1023
Fax: 617-739-8348

For application materials and information about admission to the PhD program, please contact the Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Room 435, Boston, MA 02115.
Phone: 617-432-0162

Applicants who have specific questions about the PhD program may contact Ruth Kenworthy, Division of Biological Sciences, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4470
Fax: 617-432-4098
E-mail: kenworthy@cvlab.harvard.edu

Associate Professor Phyllis Kanki recently released the results of a collaborative study with colleagues in Senegal showing that infection with HIV-2 sharply reduces the chances of becoming infected with the more deadly HIV-1; the discovery may have important implications for AIDS vaccine development.

Faculty

Department Chair: Myron E. (Max) Essex, DVM, SM (Michigan State University), PhD (University of California, Davis); Mary Woodard Lasker Professor of Health Sciences and Chairman of the Harvard AIDS Institute. Retroviruses as infectious agents in leukemia and AIDS; mechanisms of immunosuppression by retroviruses; identification of retroviral proteins for seroepidemiologic and diagnostic value and for vaccine development; hepatitis B virus and liver cancer.

Laurie H. Glimcher, MD (Harvard University); Irene Heinz Given Professor of Immunology; Professor of Medicine, Harvard Medical School. Genetic regulation of the immune response; the role of Ia (class II) major histocompatibility complex molecules and T-cell receptor proteins in T-lymphocyte activation; molecular mechanisms of regulation of class II genes.

Michael J. Grusby, PhD (Northwestern University); Assistant Professor of Molecular Immunology. Molecular and genetic analysis of cytotoxic T-lymphocyte-mediated lysis; generation of in vivo models of immune deficiency by homologous recombination in embryonic stem cells.

Phyllis J. Kanki, DVM (University of Minnesota), SD (Harvard University); Associate Professor of Pathobiology. Pathobiology of a number of human and simian retroviruses, including HTLV-I, STLV-I, SIV, HIV-1, and HIV-2; characterization of the immune response to various viral antigens and their correlation to stage of infection or disease.

Karl T. Kelsey, MD (University of Minnesota), MOH (Harvard University); Associate Professor of Occupational Medicine (Environmental Health) and Associate Professor of Radiobiology (Cancer Biology). Occupational and environmental carcinogenesis, with emphasis on the study of workplace mutagen and carcinogen exposure, using epidemiological application of cytogenetic and molecular endpoints.

and calculus. Those deficient in one of these areas may be admitted provisionally on the condition that appropriate courses will be taken before and/or after entering the program. Applicants must take both the GRE general and subject tests by October in order to meet the application deadline of December 15.

All students admitted to the program receive a stipend and tuition support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends. While funds to support international students are limited, one special scholarship is available each year for a student from a developing, sub-Saharan African country. There is also a university-wide fellowship program that provides funding to qualified underrepresented minority students in the sciences.

Graduates ordinarily assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. Career opportunities in the biological sciences as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Courses Offered by the Department of Cancer Biology, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

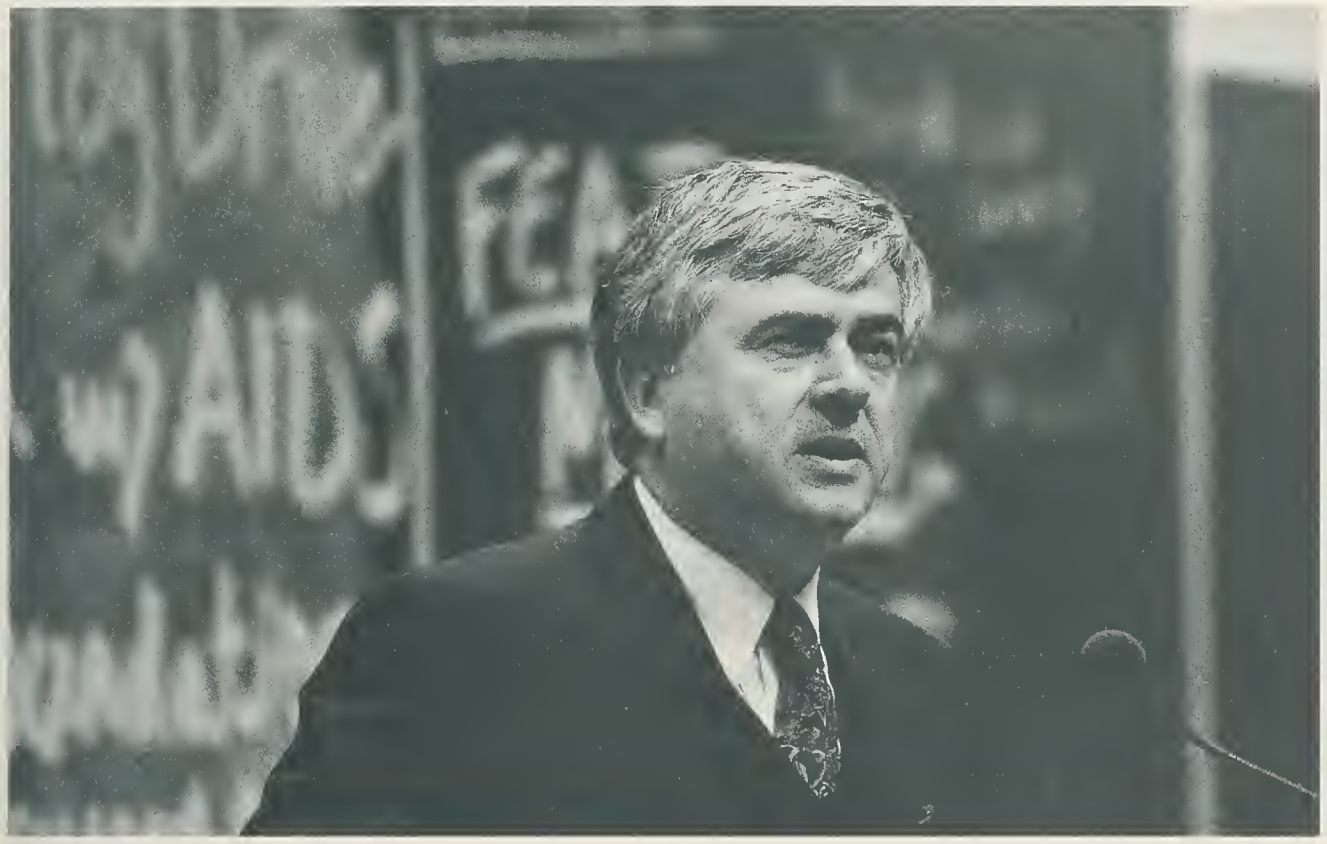
ID 211d. Vaccines: Past, Present, and Future (Essex, Walsh)
Covers such topics as methodology for new vaccine development; manufacturing and quality control; techniques to ensure appropriate use of vaccines; liability issues; cost-effectiveness analysis; decision analysis for future research, development, and distribution of vaccines; and epidemiology of vaccine-preventable illness. (2.5 credits)

CB 204ab. Immunobiology (Glimcher)
Examines the anatomy and physiology of the immune system, fate of antigen, cell trafficking, cellular interactions, regulation of the immune response, and B and T cell recognition mechanisms. (5 credits) Not offered 1995-96.

CB 207ab. Radiation Biology (Little)
Examines the biological effects of ionizing radiation, particularly as radiation serves as a model for the genotoxic and carcinogenic effects of environmental chemicals. Covers cellular and molecular processes as well as effects in humans. Emphasizes human epidemiologic data for radiation carcinogenesis and their use in risk analysis. (5 credits) Offered 1995-96 and alternate years.

CB 212ab. Introduction to Cancer Biology (Nickoloff)
Emphasizes current experimental approaches to studying cancer biology and the process of carcinogenesis. Topics include the biology of cell modification and differentiation, the phenotype of the cancer cell, properties of human and animal cancers, the process of cell transformation, mutagenesis, carcinogen metabolism, and cancer epidemiology. (5 credits) Not offered 1995-96.

CB 222d. The AIDS Epidemic: Status, Dynamics, Prospects, Conflicts (Kanki, Essex)
Deals with a broad range of topics relating to the public health implications of the AIDS epidemic, including the virology, therapy, vaccines, and etiologic hypotheses concerning the origins of the virus. Topics include the dynamics of the epidemic, public policy issues, economic implications, and social support needs. (1.25 credits)

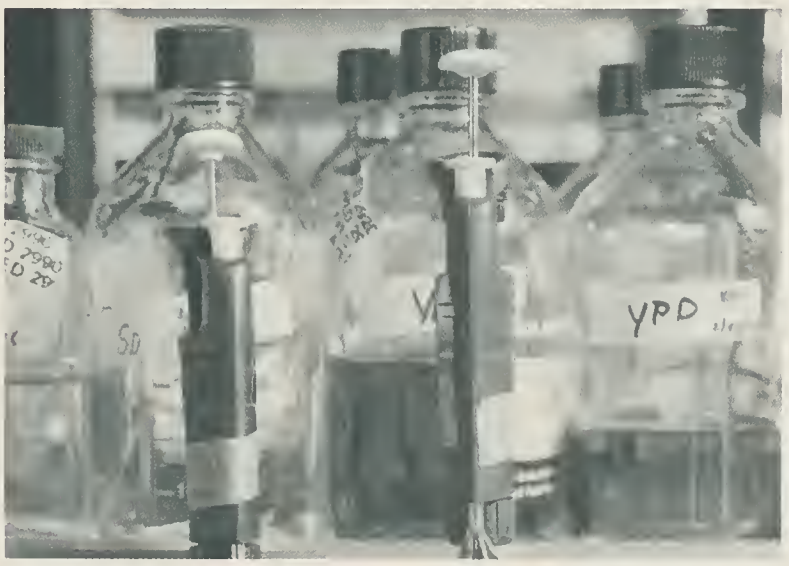


Professor Max Essex, chair of both the Department of Cancer Biology and the Harvard AIDS Institute, investigates the genetic make-up of HIV subtypes found in Africa and Asia to identify features that can be exploited in the development of a vaccine.

CB 223d. Design and Development of an AIDS Vaccine (Essex, T. Lee)
Brings together information on disease pathogenesis, the use of modern biomedical technology to design a vaccine antigen, and guidelines needed for vaccine safety and efficacy testing for a chronic infectious agent such as HIV. (2.5 credits)

CB 224cd. The AIDS Virus (Haseltine)
Provides students with a basic understanding of the biology and molecular properties of the AIDS virus. Covers initiation of infection, reverse transcriptase, integration, principles of virus particle assembly, immunology, and drug and vaccine development. (5 credits) Offered 1995-96 and alternate years.

Tutorial Programs
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or to undertake specialized readings or studies in the following areas: (a) tumor biology, focusing on approaches and techniques for the study of cancer as an infectious disease; (b) current topics in radiobiology at the molecular, cellular, and organismal levels; and (c) participation in the work of the State Laboratory Institute, which is engaged in the development, preparation, and testing of new and standard serums, vaccines, and blood fractions; research in applied immunology; diagnostic service in bacteriology, virology, and congenital metabolic disorders; and field studies on arboviruses.



Faculty

Tun-Hou Lee, SM, SD (Harvard University); Associate Professor of Virology. Humoral response to retroviral infections in humans; coding sequences of human retroviruses and their gene products; relative immunogenicity of retroviral peptides for serodiagnosis and vaccine development.

Howard L. Liber, PhD (Massachusetts Institute of Technology); Associate Professor of Radiobiology. Development and utilization of cellular and molecular methods to investigate mutagenesis in human cells.

John B. Little, MD (Boston University); James Stevens Simmons Professor of Radiobiology and Director of the Kresge Center for Environmental Health. Radiation biology and experimental carcinogenesis; cellular studies of transformation, mutagenesis, and cytogenetic damage in vitro.

Jac A. Nickoloff, PhD (University of Colorado); Associate Professor of Cancer Cell Biology. Genetic consequences of radiation-induced DNA damage and double-strand breaks in yeast and mammalian cells; molecular mechanisms of genetic recombination.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School.

Ellen M. Gravallese, MD (Columbia University); Assistant Professor in the Department of Cancer Biology. Gene expression and mechanisms of bone destruction in arthritis; mechanisms of arthritis and carditis in a murine model of Lyme disease.

Martin S. Hirsch, MD (Johns Hopkins University); Professor in the Department of Cancer Biology. Pathogenesis and therapy of human retrovirus and herpesvirus infections.

Joseph G. Sodroski, MD (Jefferson Medical College); Associate Professor in the Department of Cancer Biology. Human immunodeficiency virus pathogenesis; viral envelope glycoproteins and antiviral immune response.

DEPARTMENT OF ENVIRONMENTAL HEALTH

The Departmental of Environmental Health is concerned with the detection and prevention of adverse health effects caused by chemical and physical factors in occupational and community settings in the United States and around the world.

Salma Elreedy
SD/Environmental Health

Originally from Egypt, Salma has also lived in Pakistan, Switzerland, and Washington, DC, before coming to Harvard. "I wanted to pursue doctoral work in chemistry before I spoke with Barry Ryan, now an adjunct faculty member, about HSPH. That talk was very important because I did not know much about the school." Based on their one-and-a-half hour discussion, Salma decided to apply and was accepted; completing her one-year master's degree, however, only whetted her appetite for doctoral-level study of environmental science and engineering issues.

"I'm interested in how people's lives are affected by the environment and vice versa. I think that sustainable development is a critical issue for most of the developing world," says Salma. By participating in field work to examine lead exposure in Boston she has gained "real experience on the job." In addition to her studies at HSPH, Salma takes Spanish classes to increase her job opportunities for environmental work in Latin America.

The Department of Environmental Health focuses on complex problems that require the insights of many specialties. The department's faculty, research staff, and students reflect the multidisciplinary nature of the field and include chemists, engineers, epidemiologists, applied mathematicians, physicians, occupational health nurses, physiologists, and physicists. Teaching and research activities of the department are carried out through four main programs: Environmental Epidemiology, Environmental Science and Engineering, Occupational Health, and Physiology, as described below.

Environmental Epidemiology

The program in Environmental Epidemiology focuses on the quantification of human health effects of environmental exposures. Faculty research in this area includes studies of ambient air pollution, particularly pollutants associated with fossil fuel burning such as particles and acid aerosols; the toxicity of lead in children, including new methods to measure lead in drinking water and mothers' milk; reproductive hazards among women working in the Chinese petrochemical industry; environmental risk factors for breast cancer and for the development of chronic respiratory diseases; and indoor allergen exposures and risk of developing asthma. Research activities are based on large population studies and are carried out by multidisciplinary teams of investigators.

The degree programs in this area prepare students for research careers in environmental epidemiology. Recent graduates hold positions in academic institutions, in government agencies, and as private consultants. Financial support for Environmental Epidemiology students may be available to US citizens and permanent residents through NIH-sponsored training grants.

As described below, the Environmental Epidemiology program offers both a four-semester and a two-semester Master of Science (SM) program in Environmental Health, as well as a program leading to the Doctor of Science (SD) degree.

The program collaborates with the Department of Epidemiology for students seeking an SD in Epidemiology with a focus on environmental health. Please see page 8 for information about the Master of Public Health concentrations in Occupational and Environmental Health and in Quantitative Methods.

Master of Science in Environmental Health (four-semester program)

The master's programs in Environmental Epidemiology provide students with basic skills in environmental exposure assessment and epidemiologic methods, in preparation for research or academic careers. The four-semester (80-credit) SM program is designed for individuals who hold a bachelor's degree and have strong quantitative skills.

Required courses include EPI 200a, *Introduction to Epidemiology;* EPI 202b, *Elements of Epidemiologic Research;* EPI 203c, *Design of Case-Control and Cohort Studies;* EPE 215cd, *Environmental and Occupational Epidemiology;* EHE 268b, *Respiratory Epidemiology;* BIO 200ab, *Introduction to Statistical Methods*; BIO 220ab, *Introduction to Statistical Modeling and Data Analysis;* and BIO 210cd, *The Analysis of Rates and Proportions*. Students are encouraged to participate in research seminars within the Environmental Epidemiology program and affiliated groups.

Master of Science in Environmental Health (two-semester program)

Like the four-semester program, the two-semester (40-credit) SM program in Environmental Epidemiology provides students with basic skills in exposure assessment and epidemiologic methods, in preparation for research or academic careers. The required courses are the same as for the four-semester SM. The remainder of the schedule reflects areas of specific interest to the students. The two-semester program is open to applicants with a medical degree or a master's degree in a related scientific discipline. Students may enroll on a part-time basis, completing the program over two years.

Doctor of Science in Environmental Health

Applicants to the SD program in Environmental Epidemiology should have a master's degree in environmental health, epidemiology, or biostatistics, as well as strong quantitative skills. Doctoral students must fulfill the course requirements for a major in environmental health (20 credits) plus a minor in epidemiology (10 credits) and one other field (10 credits). In addition, they must pass a written departmental comprehensive examination, pass the school-wide oral qualifying examination, and complete, defend, and submit a thesis. The thesis consists of several publishable papers reporting epidemiologic studies of environmental exposures.

Students interested in a research career are encouraged to apply to the doctoral program in Epidemiology with a minor in Environmental Health. Candidates for an SD in Epidemiology must meet all of the requirements of that department.

Doctoral students may receive financial support through research assistantships. Some financial support for US citizens and permanent residents may be available through NIH traineeships.

Environmental Science and Engineering

The program in Environmental Science and Engineering emphasizes the chemical, physical, microbiological, engineering, and risk assessment aspects of environmental and occupational exposures. Program faculty are examining, among other things, design and evaluation of local exhaust systems and respiratory protection devices for workers; measurement and modeling of ambient, indoor, and personal exposures to gases and aerosols; development of instrumentation and methods for collection of particles and pollutant gases; development and application of biological markers of exposure and disease in animals and humans; risk assessment and risk management studies of hazardous waste sites, toxic air pollutants, and indoor contaminants; and mechanical properties of the lungs and chest wall, development of pulmonary function tests and testing equipment, and application of these methods to the study of respiratory disease. They are also engaged in

For more information about programs in Environmental Epidemiology, please contact Douglas W. Dockery, SD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0729
Fax: 617-277-2382
E-mail: dockery@sparc6b.harvard.edu

For more information about programs in Environmental Health Management, please contact John S. Evans, SD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1259
Fax: 617-432-1226
E-mail: ctsv68a@prodigy.com

For more information about programs in Environmental Health Sciences, please contact Petros Koutrakis, PhD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1268
Fax: 617-432-3349
E-mail: petros@sph.harvard.edu

For more information about programs in Industrial Hygiene and Occupational Safety, please contact Thomas J. Smith, PhD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3315
Fax: 617-432-0219
E-mail: tsmith@hohp.harvard.edu

Applicants to the doctoral program in Environmental Science and Engineering are strongly encouraged to arrange an interview with faculty if at all possible. Please contact Linda A. Fox, Program Administrator, Environmental Science and Engineering Program, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3351
Fax: 617-432-3349
E-mail: lfox@sph.harvard.edu

collaborative studies with researchers in Mexico, China, Spain, Korea, Taiwan, the Netherlands, Germany, and other countries.

Students in this program take the following core courses: BIO 200ab, *Introduction to Statistical Methods;* EPI 200a, *Introduction to Epidemiology;* EH 205ab, *Human Physiology;* EHH 260cd, *Risk Assessment and Regulatory Toxicology;* EH 261ab, *Properties of Environmental Contaminants;* EH 263cd, *Analytical Chemistry and Exposure Assessment;* and EPE 215cd, *Environmental and Occupational Epidemiology.* Advanced courses in environmental science are oriented toward a specific pollutant or medium (such as air, surface water, or groundwater); they may focus on monitoring, modeling, or the control of the pollutants, or they may emphasize resources and occupational management, regulation, and policy. Most students also take courses at the John F. Kennedy School of Government and at MIT. Students specialize in one of the following areas of concentration, each of which has additional course requirements.

Environmental Health Management In this concentration, students learn the fundamentals of environmental risk assessment and management. Concepts are drawn from diverse fields ranging from economic analysis, decision sciences, and policy analysis to the more traditional environmental sciences such as air and water pollution, analytical chemistry, and biological sciences. Graduates of the master's program typically take positions with state and federal agencies or with consulting companies emphasizing risk assessment. Doctoral graduates often take mid-level positions in federal agencies, "think tanks," and private industry, as well as faculty positions at major universities.

In addition to the general core requirements, concentrators take HPM 206ab, *Economic Analysis;* BIO 211cd, *Regression and Analysis of Variance in Experimental Research;* MIT course 1.811 or 1.812, *Environmental Law: Pollution Control;* HPE 285b, *Seminar on Risk Analysis;* and electives in environmental pollution and environmental economics.

Doctoral students in this concentration are typically funded either fully or partially by the program through research assistantships or training grant fellowships.

Environmental Health Sciences This concentration is designed for those interested in identifying and characterizing human and ecological exposures to environmental contaminants. It provides training in air and water environments, environmental microbiology, radiological health, hazardous and solid waste, exposure assessment, and pollution prevention. Graduates take positions in government agencies, such as the Environmental Protection Agency, in industry, and as consultants. Doctoral graduates also take positions in academia.

In addition to the general core requirements, concentrators take EH 264ab, *Water Environment;* EH 265cd, *Air Environment;* EH 266cd, *Land Environment and Waste Management;* MIT course 1.811, *Environmental Law: Pollution Control;* BIO 211cd, *Regression and Analysis of Variance in Experimental Research;* plus 10 credits of related electives. Faculty members associated with the Environmental Science and Engineering program conduct large national and international research projects in air and water quality, exposure and risk assessment, and radiological health, providing research opportunities for both master's and doctoral students.

Doctoral students in this concentration are typically funded either fully or partially by the program through research assistantships or training grant fellowships.

Industrial Hygiene and Occupational Safety This concentration is designed for those interested in the anticipation, identification, evaluation, and control of occupational hazards. Graduates take positions at local and federal agencies, such as NIOSH, at private companies with occupational health programs, or at research institutions and universities investigating occupational hazards. Doctoral graduates often fill faculty posts at schools of public health.

The research program in industrial hygiene and occupational safety is active in a variety of areas, including retrospective exposure assessment for epidemiologic studies of lung cancer risk from man-made vitreous fibers and of kidney

cancer risk from aliphatic hydrocarbons; physiologic and behavioral determinants of exposure avoidance by arc welders; toxicokinetic modeling of exposure-dose relationships; and petroleum hydrocarbon exposures associated with adverse effects on reproductive function.

In addition to the general core requirements, concentrators take EH 262ab, *Introduction to Occupational Hygiene;* ID 263cd, *Practice of Occupational Health;* EH 253cd, *Ventilation and Indoor Environmental Quality;* EH 254cd, *Control of Noise and Vibration;* EH 256cd, *Environmental Microbiology II: Aerobiology;* EH 241cd, *Occupational Safety,* or EH 243ab, *Ergonomics/Human Factors;* EHE 235ab, *Scientific Basis of Occupational Health Regulations;* EH 231cd, *Occupational Health Policy and Administration,* or MIT course 10.805J, *Technology, Law, and the Working Environment.* (Those participating in the internship program or specializing in hazardous waste are subject to slightly different requirements.)

Concentrators in the four-semester program who have limited work experience are encouraged to take a three- or six-month internship between their first and second years of study. Interns work under the supervision of a professional industrial hygienist in a private company or research setting to evaluate occupational hazards and develop applied research skills.

Tuition support may be available through a NIOSH Educational Resource Center Grant for highly qualified US citizens or permanent residents concentrating in Industrial Hygiene and Occupational Safety. Support for these students may also be obtained through fellowship programs offered by the Department of Energy or by the Oak Ridge Institute for Science and Education.

As described below, the Environmental Science and Engineering program offers both a four-semester and a two-semester Master of Science (SM) program in Environmental Health, as well as a program leading to the Doctor of Science (SD) degree. Please see page 8 for information about the Master of Public Health concentration in Occupational and Environmental Health.

Master of Science in Environmental Health (four-semester program)

Applicants to the four-semester (80-credit) SM program in Environmental Science and Engineering normally hold a bachelor's degree. For the concentration in Environmental Health Management, the preferred degree is in the biological or physical sciences; in Environmental Health Sciences, the degree should be in engineering, chemistry, physics, biology, or mathematics; in Industrial Hygiene and Occupational Safety, the degree should be in engineering, chemistry, physics, or quantitative or molecular biology. Applicants with other degrees who have appropriate scientific and quantitative preparation may also be considered. Most applicants have relevant work experience.

Master of Science in Environmental Health (two-semester program)

Applicants with exceptional credentials may request consideration for admission to a two-semester (40-credit) SM program in Environmental Science and Engineering with a concentration in Environmental Health Sciences or Industrial Hygiene and Occupational Safety. Candidates for the former program normally have a bachelor's degree in engineering, chemistry, physics, biology, or mathematics, as well as an advanced degree or at least two years of work experience in the environmental field. The two-semester Industrial Hygiene and Occupational Safety program is designed for practitioners with extensive experience who seek a professional credential; candidates may hold a master's or doctoral degree in engineering, chemistry, physics, quantitative or molecular biology, or a related field. Because entry into the two-semester program is based on the applicant's ability to waive several of the required courses listed in the concentration descriptions above, students' programs are designed individually.

Doctor of Science in Environmental Health

Doctoral applicants to the Environmental Science and Engineering concentration in Environmental Health Management normally have a master's degree in the biological or physical sciences. Those applying for the SD in Environ-

Faculty

Department Chair: Joseph D. Brain, SM, SM, SD (Harvard University); Cecil K. and Philip Drinker Professor of Environmental Physiology. Function and structure of pulmonary macrophages; deposition and clearance of inhaled particles and responses to them; aerosols as probes of pulmonary function.

Harriet A. Burge, MA (San Francisco State University), PhD (University of Michigan); Associate Professor of Environmental Microbiology. Aerobioogy; bioaerosols in indoor air, including sampling, analysis, and health effects; fungus allergen ecology, characterization, prevalence, and health effects.

James P. Butler, AM, PhD (Harvard University); Lecturer on Physiology. Lung structure and function; parenchymal micromechanics; magnetic twisting cytometry; nemoendocrinology; avian physiology.

David C. Christiani, MD (Tufts University), SM, MPH (Harvard University); Associate Professor of Occupational Medicine; Associate Professor of Medicine, Harvard Medical School. Occupational diseases; obstructive airways disease due to organic dust exposure; asbestos-induced lung diseases; biomarkers for solvent exposure and occupational lung disease.

Alison Cullen, SM, SD (Harvard University); Assistant Professor of Health Policy and Management (Health Policy and Management and Environmental Health). Environmental exposure and risk assessment; probabilistic approaches to gauging uncertainty in environmental hazards; international cooperation on remediation of environmental degradation. (On leave 1995-96)

Douglas W. Dockery, SM (Massachusetts Institute of Technology), SM, SD (Harvard University); Associate Professor of Environmental Epidemiology; Associate Professor of Medicine (Epidemiology), Harvard Medical School. Epidemiologic studies of respiratory health effects of air pollution; influence of environmental exposures on lifetime development of respiratory disease.

Claire M. Doerschuk, MD (Rush Medical College); Associate Professor of Physiology and Cell Biology. Transit of leukocytes through normal pulmonary microvasculature and the response of leukocytes to inflammatory stimuli within the lungs.

For more information about the Occupational Health Nursing programs, please contact Susan Legendre, Occupational Health Program, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3327
Fax: 617-432-0219
E-mail: legendre@hohp.harvard.edu

Faculty

John S. Evans, SM (University of Michigan), SM, SD (Harvard University); Senior Lecturer on Environmental Science. Assessment of human exposures to pollutants; evaluation of uncertainty; application of decision analysis; assessment of health risk from waste disposal and energy production.

Timothy E. Ford, PhD (University of Wales, Bangor); Assistant Professor of Environmental Microbiology. Surface, source, and drinking water microbiology; microbial cycling/transformation of pollutants; microbiologically influenced corrosion; groundwater-surface water interactions; aerosolization of microorganisms and microbial products.

Jeffrey J. Fredberg, SMME, ME, PhD (Massachusetts Institute of Technology); Professor of Bioengineering and Physiology; Associate Professor of Pediatrics, Harvard Medical School. Identification of the mechanical basis of airway and lung parenchymal function at the levels of organ, tissue, cell, and protein.

Gareth M. Green, MD (Harvard University); Professor of Environmental Health and Associate Dean for Professional Education. Air pollution and occupational/environmental lung disease; defense mechanisms, lung clearance, and biomarkers; education, science, and policy.

Joseph J. Harrington, AM, PhD (Harvard University); Professor of Environmental Health Engineering (Environmental Health and Population and International Health); Gordon McKay Professor of Environmental Engineering, Faculty of Arts and Sciences. Water resources planning and quality management; environmental monitoring and control systems; applied statistics for modeling; management for tropical disease control.

mental Health Sciences normally have a master's degree in environmental science or a related field and strong scientific and quantitative skills. Industrial Hygiene and Occupational Safety applicants normally hold a master's (in rare cases, only a bachelor's) degree in engineering, chemistry, physics, or quantitative or molecular biology. Applicants are also expected to have relevant work experience.

Students undertake a comprehensive program in their specialty area, as outlined in the concentration descriptions above, and must fulfill course requirements for one major (20 credits) and two minor (10 credits each) fields. Doctoral candidates must pass the departmental written examination and the school-wide oral qualifying examination; complete, defend, and submit a thesis; and serve as a teaching assistant for the equivalent of three five-credit courses. During the course of their program, most doctoral students also take advantage of opportunities to present papers at scientific conferences.

Occupational Health

This program is designed to train occupational safety and health professionals to recognize and prevent occupational injuries and disease. Program faculty carry out research spanning a wide range of occupational health problems, with the broad objective of identifying and contributing to the reduction or elimination of job-related health hazards. Areas of interest include studies of respiratory disease in Chinese textile workers; cumulative trauma injuries in garment workers; biological and chemical hazards in biotechnology and biomedical laboratories; development of instruments to measure body lead burden; the political economy and social perception of occupational disease; health effects of cutting oils on General Motors employees; analysis of occupational health policy and management issues; and workplace ergonomics.

The training programs in occupational safety and health are offered through the NIOSH-sponsored Educational Resource Center for Occupational Safety and Health (see page 83). As described below, the following programs are offered: Master of Science (SM) and Doctor of Science (SD) in Environmental Health with a concentration in Industrial Hygiene and Occupational Safety; SM in Primary Health Care Nursing (one-year program) and SM in Environmental Health with a concentration in Occupational Health Nursing (four-semester, two-degree program), both in cooperation with Simmons College; Master of Occupational Health (MOH); SM in Environmental Health with a concentration in Occupational Safety and Health; and SD in Environmental Health with a concentration in Environmental Molecular Epidemiology or Occupational Health, or Doctor of Public Health (DPH). Please see page 8 for information about the MPH concentration in Occupational and Environmental Health.

Master of Science/Doctor of Science in Environmental Health

The concentration in Industrial Hygiene and Occupational Safety is designed for those interested in the anticipation, identification, evaluation, and control of occupational hazards. Admissions and curriculum are administered through the department's Environmental Science and Engineering Program, described on page 25.

Master of Science in Primary Health Care Nursing (one-year program)

This program is offered by the Educational Resource Center and Simmons College, which awards the degree. It is designed for registered nurses who are seeking preparation as occupational health nurse practitioners.

Participants undertake practica in industrial settings, clinics, and hospital-based occupational health programs and complete the following courses, taught at Simmons College: NUR 404, *Normal and Abnormal Human Physiology;* NUR 406, 407, 408, *Research Methods I, II, III;* NUR 480, 482, *Theory and Practice: Primary Health Care Nursing I, II;* NUR 481, *Theoretical Foundations for Nursing Practice;* NUR 422, *Clinical Pharmacology for Nurses in Ambulatory Care;* NUR 485, 486, *Health in the Workplace I, II;* NUR 490, *Seminar in Leadership and Role Development in Primary Health Care Nursing;* and one elective.

Applicants must have at least a bachelor's degree in nursing from a program accredited by the National League of Nursing, must show satisfactory completion of a basic statistics course,

and must be registered to practice nursing in a US state or territory. Tuition support may be available for US citizens or permanent residents through NIOSH traineeships or other traineeships or scholarships.

Four-Semester, Two-Degree Master of Science in Environmental Health (HSPH) and Primary Health Care Nursing (Simmons College)

The dual-degree program in Occupational Health Nursing is also aimed at preparing nurses for positions as occupational health nurse practitioners. It emphasizes identification of health hazards, workplace assessment, program planning and intervention, worker health promotion, and disease and injury prevention. The program integrates curricula from HSPH and Simmons College, with courses taken concurrently at both institutions. Nurses interested in this program must apply to and be accepted by both schools.

Students in the dual degree program fulfill essentially the same course requirements at Simmons College as those enrolled in the one-year SM program. In addition, they must take the following HSPH courses: EH 243ab, *Ergonomics/Human Factors;* EH 262ab, *Introduction to Occupational Hygiene;* EH 241cd, *Occupational Safety;* ID 263cd, *Practice of Occupational Health;* BIO 201ab, *Principles of Biostatistics;* EH 239ab, *Case Studies in Occupational Health Nursing;* EPI 201a, *Principles of Epidemiology;* EH 231cd, *Occupational Health Policy and Administration;* EH 238cd, *Occupational Health Nursing Management;* EPE 215cd, *Environmental and Occupational Epidemiology;* a core course in social and behavioral sciences; and three electives. Students must also complete an independent study project.

Applicants must have at least a bachelor's degree in nursing from a program accredited by the National League of Nursing, must show satisfactory completion of a basic statistics course, and must be registered to practice nursing in a US state or territory. Tuition support may be available for US citizens or permanent residents through NIOSH traineeships or other traineeships or scholarships.

Master of Occupational Health

This two-semester (40-credit) program is designed to train physicians in the public health disciplines relevant to the prevention and control of occupational disease and injury. Physicians interested in occupational medicine may apply either to the MOH program or to the Occupational and Environmental Health concentration of the Master of Public Health (MPH) program (see page 8). The MOH is usually taken as the first year of a two-year Occupational and Environmental Medicine Residency.

Core course requirements for the MOH (or the MPH) are as follows: BIO 201ab, *Principles of Biostatistics;* EH 201b, *Introduction to Environmental Health;* EH 243ab, *Ergonomics/Human Factors,* or EH 241cd, *Occupational Safety;* EH 262ab, *Introduction to Occupational Hygiene;* EPI 201a, *Principles of Epidemiology;* HSB 200a, *Social and Behavioral Dimensions of Public Health* (or alternate); TOE 204ab, *Principles of Toxicology;* EH 231cd, *Occupational Health Policy and Administration;* EH 232cd, *Introduction to Occupational Medicine;* EPE 215cd, *Environmental and Occupational Epidemiology;* and ID 263cd, *Practice of Occupational Health.* Recommended electives include either BIO 210cd, *The Analysis of Rates and Proportions,* or BIO 211cd, *Regression and Analysis of Variance in Experimental Research.* MOH students may also choose to take ID 250a, *Ethical Basis of the Practice of Public Health,* which is required by the MPH program. Also recommended is MIT course 10.805J, *Technology, Law, and the Working Environment.*

The Occupational and Environmental Medicine Residency emphasizes the development of skills in clinical occupational medicine and occupational epidemiology. During this year, acquired knowledge and abilities are applied to patient management and workplace problem solving, and at least one short-term research project is designed, executed, and documented under faculty supervision. Field experience includes rotations through hospital-based occupational health clinics, the Massachusetts Division of Occupational Hygiene, and corporate medical departments. The residency is fully accredited by the Accreditation Council for Graduate Medical Education.

For more information about the Master of Occupational Health program, please contact Daryl Bichel, Assistant Director, Occupational Health Program, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3314
Fax: 617-432-0219
E-mail: dbichel.ofs@sph.harvard.edu

Faculty

Robert F. Herrick, MS (University of Michigan), SD (Harvard University); Lecturer on Industrial Hygiene. Exposure-reactive aerosols; characterization of complex exposures; interaction of individuals with a source of exposure.

Howard Hu, MD (Albert Einstein College of Medicine), MPH, SM, DPH (Harvard University); Associate Professor of Occupational Medicine. Epidemiology of chronic lead toxicity using biomarkers of bone lead accumulation and genetic susceptibility.

Karl T. Kelsey, MD (University of Minnesota), MOH (Harvard University); Associate Professor of Occupational Medicine (Environmental Health) and Associate Professor of Radiobiology (Cancer Biology). Occupational and environmental carcinogenesis, with emphasis on the study of workplace mutagen and carcinogen exposure, using epidemiological application of cytogenetic and molecular endpoints.

Petros Koutrakis, MS, PhD (University of Paris); Associate Professor of Environmental Sciences. Sampling and analysis of air pollutants; atmospheric, indoor air, and aerosol chemistry; application of multivariate techniques to source apportionment; acid rain; urban air pollution.

Donald K. Milton, MD (Johns Hopkins University), MPH, DPH (Harvard University); Assistant Professor of Occupational Medicine. Measurement of airborne endotoxin; epidemiology of acute and chronic responses to bioaerosol exposure.

Richard R. Monson, MD, SM, SD (Harvard University); Professor of Epidemiology (Environmental Health and Epidemiology) and Director of the Educational Resource Center for Occupational Safety and Health. Relationship between the workplace, the environment, and disease; causes of abnormalities of pregnancy.

Timothy Ford (right), assistant professor of environmental microbiology, studies the effects of pollution on microscopic organisms in the harbor of New Bedford, Massachusetts.

For more information about programs in Occupational Safety and Health, please contact Richard R. Monson, MD, SD, Occupational Health Program, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3325
Fax: 617-432-0219
E-mail: monson@hohp.harvard.edu

For more information about the program in Environmental Molecular Epidemiology, please contact Karl T. Kelsey, MD, MOH, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3313
Fax: 617-432-0219
E-mail: kelsey@hohp.harvard.edu

Faculty

Lucas M. Neas, MSE (West Virginia College of Graduate Studies), SD (Harvard University); Assistant Professor of Environmental Health and Epidemiology. Environmental determinants of respiratory symptoms and pulmonary function; longitudinal studies of acute responses to environmental contaminants; environmental risk factors for breast cancer.

Joseph D. Paulauskis, MS, PhD (Miami University); Assistant Professor of Molecular Biology. Molecular/biochemical mechanisms of toxicity for environmentally relevant contaminants; gene regulation during pulmonary inflammation.

Lorenz R. Rhomberg, PhD (State University of New York at Stony Brook); Assistant Professor of Risk Assessment (Health Policy and Management and Environmental Health). Critical analysis of the methods and procedures of human risk assessment, especially quantitative methods for putative carcinogens.

Applicants must be graduates of an approved school of medicine and must have completed at least one year of clinical training in internal medicine or family practice; board eligibility or certification in a primary care specialty is preferred. Physicians currently holding positions in the field of occupational safety and health who plan to return to these positions are considered particularly strong candidates for admission. In addition to submitting an application to the degree program, prospective residents should send a letter of interest to the Occupational Health Program, enclosing a curriculum vitae listing medical training and experience, research experience, and publications. Admission to the practicum year of the residency is a separate process from admission to the degree program, and usually occurs shortly after admission to the degree program. Continuation into the second year of the residency is contingent upon having had adequate prior clinical experience and exemplary performance in the didactic phase of the program. Applications for the degree program are reviewed and approved beginning in September for admission in September of the following year. Applicants who require early notification of admission to the residency program should indicate this in a cover letter accompanying the application form.

Some financial support for residency candidates who are US citizens or permanent residents may be available through traineeships or National Research Service Awards.

Master of Science in Environmental Health

The concentration in Occupational Safety and Health emphasizes the epidemiologic and biostatistical aspects of this field. It is normally completed over four semesters, although an individual with a PhD or JD may be admitted to a two-semester program. It is generally expected that students without a prior doctoral degree will subsequently wish to enroll in a doctoral program.

Applicants normally have a bachelor's degree and advanced training in science, including college-level organic and inorganic chemistry. Those currently holding positions in the field of occupational safety and health who plan to return to these positions are considered particularly strong candidates for admission. Some financial support may be available for US citizens or permanent residents through traineeships or National Research Service Awards.

Doctor of Science in Environmental Health/Doctor of Public Health

An SD or DPH degree may be earned by students who wish to concentrate in Environmental Molecular Epidemiology or in Occupational Health. Students fulfill course requirements in one major (20 credits) and two minor fields (10 credits each). In addition, they must pass a written departmental comprehensive examination, pass the school-wide oral qualifying examination, and complete, defend, and submit a thesis.

Environmental Molecular Epidemiology This doctoral concentration, expected to be offered in fall 1996, focuses on the use of biomarkers in the epidemiologic study of exposure-related disease. Students ordinarily take core courses in occupational health with added emphasis on the study of biomarkers (including EHE 280cd, *Biomarkers in Occupational and Environmental Health,* and EPI 250c, *Studies in Molecular Epidemiology*), epidemiologic methods (EPI 202b, *Elements of Epidemiologic Research*), physiology (EH 225cd, *Advanced Topics in Physiology*), and a course in exposure assessment for occupational and environmental epidemiology. Students conduct research in areas related to the development and utilization of molecular biomarkers in environmental and occupational health.

Financial assistance may be available for US citizens or permanent residents who plan to pursue research and teaching careers in environmental molecular epidemiology. Candidates must be enrolled in a doctoral program or postdoctoral fellowship in occupational health, environmental health, or epidemiology.

Occupational Health Please contact the Occupational Health Program (phone: 617-432-0219) for additional information about doctoral programs in this area.

Physiology

The program in Physiology focuses on normal and pathological functions of organisms. It centers on the respiratory system, which presents an immense, thin surface area to the environment, and thus is an important route of entry and site of damage from toxins and infections. The program deals with respiratory mechanics, respiratory neurophysiology and psychophysics, airway pharmacology, and respiratory defense mechanisms, especially pulmonary cell and molecular biology in relation to macrophages. It also emphasizes inhalation toxicology and the pathology of environmental and occupational lung disease. The biology is broadly based, ranging from molecular and cell biology to integrated organismic, environmental, and comparative physiology.

The Physiology program integrates a range of scientific disciplines, including physics, bioengineering, physiology, biomathematics, cell biology, molecular biology, clinical science and epidemiology. By working within this rich interdisciplinary environment, students learn many measurement technologies, discover a variety of disciplinary approaches, and develop mature scientific thinking. Special facilities are available, including a confocal microscope, analytical electron microscopes, a flow cytometer, a sleep laboratory, and a sensation laboratory, as well as techniques developed by the program.

As described below, the program leads to the Doctor of Philosophy (PhD) degree, offered through the Biological Sciences in Public Health Program (a component of the Division of Medical Sciences, Graduate School of Arts and Sciences). Applicants may elect to follow a different curriculum leading to the Doctor of Science (SD) degree; this option may be available by special arrangement with the department.

Doctor of Philosophy in Biological Sciences in Public Health (BPH) (Physiology)

Students wishing to study cellular and molecular biology or physiology as they pertain to major problems in public health should apply to the Biological Sciences in Public Health program. This program offers the PhD degree through Harvard University's Graduate School of Arts and Sciences, Division of Medical Sciences, Committee on Biological Sciences in Public Health.

The program is designed to prepare students for research careers in respiratory physiology. It offers a firm foundation in the basic biomedical sciences, as well as in epidemiology and biostatistics. Specific courses supplement this core, as dictated by individual research concentrations. Students in this program engage in laboratory rotations in three different research areas, to enable them to assess realistically their interests in a thesis project and to evaluate the suitability of the laboratory and the mentor. At the completion of these rotations, students select an area of concentration and a thesis research laboratory and complete

For more information about the Physiology program, please contact Joseph D. Brain, SD, Physiology Program, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1272
Fax: 617-432-4710

For application materials and information about admission to the PhD program, please contact the Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Room 435, Boston, MA 02115.
Phone: 617-432-0162

Applicants who have specific questions about the PhD program may contact Ruth Kenworthy, Division of Biological Sciences, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4470
Fax: 617-432-4098
E-mail: kenworthy@cvlab.harvard.edu

Faculty

Stephen N. Rudnick, MS (University of Pennsylvania), SM, SD (Harvard University); Lecturer on Industrial Hygiene Engineering. Engineering control of particulate air contaminants in indoor and occupational settings and engineering control systems; sampling and analysis of air contaminants.

Joel D. Schwartz, PhD (Brandeis University); Associate Professor of Environmental Health. Environmental epidemiology; natural history of lung function and disease; cost-benefit analysis; nonclassical time series analysis; nonparametric smoothing and graphical methods in epidemiology.

Jacob Shapiro, SM (Brown University), PhD (University of Rochester); Lecturer on Biophysics in Environmental Health. Occupational and environmental radiation protection; low-level radioactive waste disposal; radiation dosimetry and protection standards; environmental radiation surveillance.

Steven A. Shea, PhD (London University); Assistant Professor of Physiology. Control of breathing, respiratory sensations, and sleep physiology in humans.

Faculty

Stephanie A. Shore, PhD (McGill University); Associate Professor of Physiology. Airway physiology and pharmacology; role of neuropeptides in the pathogenesis of airway disease.

Thomas J. Smith, MPH, MS, PhD (University of Minnesota); Professor of Industrial Hygiene. Evaluation of exposure-response relationships through occupational epidemiologic studies; application of pharmacokinetic modeling to study exposure-tissue dose relationships; lab and field simulations to characterize exposure determinants.

Stover H. Snook, AM (Fordham University), PhD (Tufts University); Lecturer on Ergonomics. Low-back pain; manual materials handling; heat stress; fatigue; stairway design; personal protective equipment; cumulative trauma disorders.

Frank E. Speizer, MD (Stanford University); Professor of Environmental Science; Professor of Medicine, Harvard Medical School. Environmental epidemiology; pulmonary diseases; cancer and nutrition; health effects of air pollution; occupational and environmental medicine.

John D. Spengler, PhD (State University of New York at Albany), SM (Harvard University); Professor of Environmental Health. Assessment of human exposures to environmental contaminants; application of advanced particle analysis techniques to identify source contributions to indoor and ambient aerosols; building-related illnesses.

Ning Wang, MS (Huazhong University of Science and Technology), SD (Harvard University); Assistant Professor of Physiology and Cell Biology. Cytoskeletal mechanics; mechanochemical signal transduction; cell adhesion and migration; cancer metastasis; effects of mechanical forces on cells.

Xiping Xu, MD (Anhui Medical University, China), PhD (University of Tsukuba, Japan), SM (Harvard University); Assistant Professor of Occupational Epidemiology. Association of environmental and occupational exposure with lung function, reproduction outcomes, respiratory and cardiovascular diseases, cancers, and mortality.

the required curriculum. A qualifying examination must be passed before engaging in thesis work, and the thesis must be defended before the granting of the PhD. Some students also participate in the Harvard-Markey Biomedical Scientist Training Program, a new pathway of graduate education designed to offer PhD students a greater knowledge of human biology and disease.

Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Those deficient in one of these areas may be admitted provisionally on the condition that appropriate courses will be taken before and/or after entering the program. Applicants must take both the GRE general and subject tests by October in order to meet the application deadline of December 15.

Most students admitted to the program receive a stipend and tuition support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends. While funds to support international students are limited, one special scholarship is available each year for a student from a developing, sub-Saharan African country. There is also a university-wide fellowship program that provides funding to qualified underrepresented minority students in the sciences.

Graduates ordinarily assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. Career opportunities in the biological sciences as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Courses Offered by the Department of Environmental Health, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

EH 201b. Introduction to Environmental Health (Green)
Analyzes health problems stemming from contamination of air, water, food, the workplace, and other special environments. Examines policy required for regulation and strategies for prevention and control. (2.5 credits)

EH 202d. Principles of Environmental Health (Green, Evans, Brennan)
Focuses on the assessment of risk to health from environmental exposures, the use of such data in policy development and environmental management, and legal strategies for redressing environmental injury and controlling environmental degradation. (2.5 credits)

EH 205ab. Human Physiology (Shea, Shore, Banzett)
Introduces biological principles, physiology of cells, organ systems, and the organism. Includes some pathophysiology. (5 credits)

EH 223ab. Advanced Respiratory Physiology (Butler)
Covers lung structure, volume and flow mechanics, surfactant function, gas exchange, and lung and chest wall interaction. Presents classic concepts and recent advances. (5 credits)

EH 225cd. Advanced Topics in Physiology (Fredberg, Shore, Paulauskis, Wang)
Allows students to focus on special topics in lung biology. The topic for 1995-96 is the physical basis and quantitative description of chemical, electrical, and mechanical signalling. (5 credits)

EH 231cd. Occupational Health Policy and Administration (Monson, Langer)
Examines legal, economic, and political foundations of occupational health activities in the US. Discusses roles of government, unions, research organizations, and corporations. (2.5 credits)

EH 232cd. Introduction to Occupational Medicine (Hu, Christiani)
Reviews diagnosis following exposure to specific workplace substances, including asbestos, lead, and organic solvents. Presents techniques for assessing disability. (2.5 credits)

EHE 235ab. Scientific Basis of Occupational Health Regulations (Eisen, Wegman)
Reviews the scientific basis for the association of occupational exposures and disease. Emphasizes the evaluation of epidemiologic literature, the interface of science and regulatory policy, and the role of risk analysis in setting health standards. (5 credits)

EH 238cd. Occupational Health Nursing Management (Monson, Travers)
Requires students to apply skills and knowledge to occupational health programs. Includes organizational development, communication skills, and techniques for managing change. (2.5 credits)

EH 239ab. Case Studies in Occupational Health Nursing (Monson, Legendre, Love, Gordon)
Uses case studies of workplace situations and circumstances to provide a foundation for the development of skills and strategies necessary for program planning and development. Prepares students for field placements. (2.5 credits) Not offered 1995-96.

EH 241cd. Occupational Safety (Mangone, Snook)
Covers principles of occupational safety, including safety regulation and standards, models of accident causation, investigation procedures, and techniques for accident control. (2.5 credits)

EH 243ab. Ergonomics/Human Factors (Snook, Ciriello)
Emphasizes the design of the job to fit the worker. Investigates specific problems resulting from the nature of the job itself and considers the physiological, biomedical, psychological, and anatomical characteristics of the worker in the development of good job design principles. (2.5 credits)

EH 250cd. Control of Workers' Exposure at Hazardous Waste Sites (Rudnick, Walters, Martin)
Covers the evaluation, assessment, and control of workers' exposure to chemical, biological, and physical agents at hazardous waste treatment, storage, disposal, and clean-up sites and during emergency response activities. Includes field trips and laboratory sessions. (2.5 credits)

EH 253cd. Ventilation and Indoor Environmental Quality (Rudnick, DiBerardinis, Spengler)
Covers industrial ventilation for control of workers' exposure to airborne contaminants, HVAC systems, energy audits, indoor environmental quality guidelines, fibers, biologicals, and electromagnetic fields. Includes field trips and laboratory sessions. (5 credits)

EH 254cd. Control of Noise and Vibration (Rudnick)
Covers the fundamentals, evaluation, and control of noise and vibration. Includes field trips and laboratory sessions. (2.5 credits)

EH 255cd. Environmental Microbiology I (Ford)
Emphasizes environmental microbiology of aquatic systems. Covers bioremediation, release of genetically engineered organisms, pathogen survival in drinking water, microbiological control, biodeterioration, and microbial transformations. (2.5 credits)

EH 256cd. Environmental Microbiology II: Aerobiology (Burge, Milton, Muilenberg)
Emphasizes the microbiology of the air, including the nature of organisms producing aerosols, the nature of aerosols and the dynamic of aerosols populations, exposure assessment issues, and health effects. (2.5 credits)

EHH 260cd. Risk Assessment and Regulatory Toxicology (Evans, Gray, Graham)
Covers principles of exposure assessment, toxicology, and risk assessment; introduces methods for modeling the concentration of environmental pollutants; describes elements of risk assessment; considers methods for error analysis and computation of the value of improved information. (5 credits)

EH 261ab. Properties of Environmental Contaminants (Herrick)
Uses the common thread of thermodynamics to cover the properties of environmental contaminants and the physical principles underlying their behavior. Topics include elementary chemical thermodynamics, kinetic theory of gases, acid-base chemistry, and environmental science. (5 credits)

EH 262ab. Introduction to Occupational Hygiene (Smith)
Covers key aspects of industrial hygiene, including recognition, evaluation, and control of health hazards at work. Considers chemical, physical, and biological hazards, and the criteria for each. Includes one or more workplace visits. (2.5 credits)

EH 263cd. Analytical Chemistry and Exposure Assessment (Yanagisawa, Smith, Shapiro, Lee)
Requires students to design and implement field investigations to assess human exposures to environmental pollutants in occupational or community settings. Explains techniques in analytical chemistry and radiation measurements appropriate for exposure assessment. (5 credits)

EH 264ab. Water Environment (J. Harrington)
Introduces quantitative approaches for modeling, evaluating, and managing the provision of urban water and the collection, treatment, and disposal of spent water. Includes a field trip. (2.5 credits) Not offered 1995-96.

EH 265cd. Air Environment (Koutrakis)
Covers the history and health effects of air pollution; atmospheric physics and chemistry; major air pollution sources; air pollution modeling; no-point source models and source inventories; and air pollution management. (5 credits)

Faculty

Yukio Yanagisawa, MEng, DEng (University of Tokyo); Associate Professor of Environmental Health. Development of monitoring equipment and methods to measure exposures to oxidants, nitrogen dioxide, and carbon monoxide; physical modeling of air pollution; biological markers of contaminant exposure.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School, unless otherwise indicated.

Robert B. Banzett, PhD (University of California, Davis); Associate Professor in the Department of Environmental Health. Respiratory neurophysiology and mechanics; perceived sensation; control; interaction with locomotion; fluid dynamics in the avian lung.

Harold A. Chapman, Jr., MD (University of Alabama); Associate Professor in the Department of Environmental Health. Pathophysiology of chronic inflammatory reactions in the lung; biology of proteases and antiproteases; role of coagulation and fibrinolysis in the pathogenesis of acute lung injury.

Jeffrey M. Drazen, MD (Harvard University); Professor in the Department of Environmental Health. Pulmonary and respiratory pharmacology; mediators of immediate hypersensitivity; mucus regulation and expression in chronic bronchitis.

John J. Godleski, MD (University of Pittsburgh); Associate Professor in the Department of Environmental Health. Experimental models of normal and pathologic responses to inhaled particles.

Rose H. Goldman, MD (Yale University), MPH, SM (Harvard University); Assistant Professor in the Department of Environmental Health. Occupational health in the biotechnology industry; metal poisoning; neurotoxicity; cumulative trauma injuries.

Lester Kobzik, MD (Tufts University); Assistant Professor in the Department of Environmental Health. Lung macrophage phagocytosis and response to inhaled particles; pulmonary inflammation and pathology.

Faculty

Stephen H. Loring, BMS (Dartmouth Medical School), MD (Harvard University); Associate Professor in the Department of Environmental Health. Chest wall mechanics, hyperinflation, and lung transplantation; mechanics and physiology of respiratory muscles and the pleural space.

Angeline E. Warner, MS (University of Miami), DVM (University of Florida), SD (Harvard University); Assistant Professor in the Department of Environmental Health. The role of mononuclear cells, specifically pulmonary intravascular macrophages in inflammatory lung injury and the adult respiratory distress syndrome.

Adjunct Faculty

Ellen A. Eisen, SM, SM, SD; Professor of Work Environment, University of Massachusetts, Lowell.

Dean M. Hashimoto, MS, MD, JD, MOH; Staff Physician, Occupational Medicine Clinic, Massachusetts General Hospital.

P. Barry Ryan, SM, PhD; Professor of Environmental and Occupational Health, Emory University.

Peter A. Valberg, AM, SM, PhD; Senior Associate, Gradient Corporation.

David H. Wegman, MD, SM; Professor and Chair, Department of Work Environment, University of Massachusetts, Lowell.

EH 266cd. Land Environment and Waste Management (First)
Focuses on the nature, sources, and amounts of municipal, industrial, and hazardous wastes; laws governing storage, environmental control, transport, and disposal; waste management, minimization, elimination, and recycling. Includes field trips to waste management, recycling, and disposal facilities. (2.5 credits)

EH 267cd. Occupational Exposures Seminar (Smith)
Refines communication skills of students who have participated in the Industrial Hygiene Internship (EH 273ab). Students present seminars on their internships and prepare posters on their work for the American Industrial Hygiene Conference and Exposition. (2.5 credits)

EHE 268b. Respiratory Epidemiology (Dockery)
Reviews the epidemiology of chronic respiratory diseases; presents demographic distribution and time trends of these diseases; and discusses known risk factors, with particular attention to environmental hazards. (1.25 credits)

EEB 271c. Advanced Regression Techniques for Environmental Epidemiology (Schwartz, Neas, P.B. Ryan)
Covers nonlinear exposure-response relationships and repeated measure designs, including smoothing techniques, generalized additive models, robust regression, and time series models. Students use datasets to model effects of exposures on health outcomes. (2.5 credits)

EH 273ab. Industrial Hygiene Internship (Smith)
Places students in an industrial or similar workplace under the direction of an experienced industrial hygienist to learn evaluation techniques and to study a specific hazard or problem. (20 credits)

EH 275d. Global Climate Change: Impact/Response (Yanagisawa, Lee, Jahng)
Provides an understanding of physical and chemical aspects of the global climate, such as heat balance of the Earth and chemical properties of greenhouse gases. Discusses geological and public health effects and mitigation measures. (2.5 credits) Offered 1995-96 and alternate years.

EH 276ab. Case Studies in Exposure and Risk Assessment (Spengler, Ozkaynak)
Reviews personal and population exposure models for predicting multimedia and multipathway exposures to volatile organic compounds, gases, particles, and metals. Demonstrates application of physical and semi-empirical exposure models for predicting exposures and health risks. (2.5 credits)

The Interdisciplinary Programs in Health (IPH) enlist scholars from the natural and social sciences in finding new ways to deal with the critical environmental problems of today's society. A university-wide, nondegree program, IPH aims to bring to environmental problems the knowledge, skills, insights, and analytic techniques of a variety of disciplines. The program accepts both postdoctoral fellows and visiting scientists and scholars. Fellows are graduates of advanced degree programs who seek preparation for research or service careers related to environmental health. Fellowships are awarded for a term of one year and are renewable for a second year. Visitors may be on leave from universities, industry, or public-interest organizations. For more information, please contact John S. Evans, SD, Department of Environmental Health, 665 Huntington Avenue, Boston, MA 02115 (phone: 617-432-1259).

EHE 280cd. Biomarkers in Occupational and Environmental Health (Kelsey, Christiani, Monson)
Covers the use of biomarkers as measures of exposure, absorbed dose, biological effect, and health outcome in acute and chronic disease states. (2.5 credits) Not offered 1995-96.

Tutorial Programs, Field Experience
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or to undertake specialized readings or studies in the following areas: aerosol technology, air pollution control, environmental health management, environmental epidemiology, environmental microbiology, industrial hygiene and ventilation, nuclear medicine, occupational medicine, radiological health, respiratory biology, respiratory epidemiology, and solid waste management. Supervised site visits and field research projects are available in medical, industrial hygiene, and environmental health departments of industries and governmental agencies.

DEPARTMENT OF EPIDEMIOLOGY

Epidemiology is the study of the frequency and distribution of disease and its determinants, and is one of the fundamental sciences of public health. The aims of epidemiologic research ultimately lie in the prevention or effective control of human disease. For more than four decades, the Department of Epidemiology has worked to advance the understanding of human biology and, thereby, to improve the human condition.

Loren Lipworth
SD/Epidemiology

"I chose epidemiology because I wanted to work with people. I had come from a lab setting in which I only worked with animals," says Loren, a second-year doctoral student. "My first career goal was to go to medical school, but I realized that my interests in science and health wouldn't be fully tapped." She worked for nine months doing research for a TV medical correspondent before realizing that public health was the field for her. "Everything I researched for the TV show was public health related, and the experience really sparked my career interest."

At HSPH Loren has found time for laboratory research as well as teaching. "I'm researching breast cancer and endogenous hormonal risk factors for Professor Trichopoulos and collaborating with researchers outside of the US." Her biggest surprise was the access to faculty members and their encouragement and support for her development. "I've really enjoyed the opportunity to work as a teaching assistant in the department and to combine both research and teaching with my own studies." For the summer Loren will travel to Sweden to teach a one-week epidemiology course before returning for the fall semester.

Current research in the Department of Epidemiology focuses on such topics as the role of viruses in the etiology of cancer; the connection between diet and risk of cancer, cardiovascular disease, and other major chronic diseases; the relationship between exposure to chemicals in the workplace and the development of cancer; the relationship of hormonal patterns and breast cancer; factors in early life predisposing individuals to chronic diseases; case identification and risk factors in mental disorders; health effects of oral contraceptives and post-menopausal hormones; causes of human infertility; and therapeutic failure and adverse events in the use of lipid lowering agents.

Recent graduates of department programs have become officers in the Epidemic Intelligence Service of the Centers for Disease Control and Prevention, epidemiologists at the National Cancer Institute, and faculty members at universities and medical schools.

As described below, the department offers both a four-semester and a two-semester Master of Science (SM) program, as well as a program leading to the Doctor of Science (SD) or Doctor of Public Health (DPH) degree. Students in these programs choose among the following concentrations. Please see page 8 for information about the Master of Public Health concentration in Quantitative Methods.

Cancer Epidemiology The curriculum in this concentration includes courses on the biology and genetics of cancer; the basic concepts and issues of cancer epidemiology; the roles of diet, oncogenic viruses, and occupational exposures in the etiology of cancer; the prevention of cancer; and research methods. Research opportunities for students include a large number of ongoing cohort and case-control studies within the department and in conjunction with the Dana-Farber Cancer Institute. Financial support may be available for US citizens or permanent

For more information about programs in Cancer Epidemiology, please contact Nancy E. Mueller, SD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4576
Fax: 617-566-7805
E-mail: mueller@episun1.harvard.edu

For more information about programs in Cancer Prevention, please contact Graham A. Colditz, MB, BS, DPH, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2754
Fax: 617-432-0335
E-mail: nhgac@gauss.med.harvard.edu

For more information about programs in Cardiovascular Epidemiology, please contact Meir J. Stampfer, MD, DPH, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2747
Fax: 617-432-0335

For more information about epidemiology research traineeships in cardiovascular disease or aging, please contact Julie E. Buring, SD, or Charles H. Hennekens, MD, DPH, 900 Commonwealth Avenue East, Boston, MA 02215.
Phone: 617-732-4965

For more information about programs in Clinical Epidemiology, please contact E. Francis Cook, SD, Section on Clinical Epidemiology, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115.
Phone: 617-732-5650

For more information about programs in Environmental/Occupational Epidemiology, please contact Richard R. Monson, MD, SD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4587
Fax: 617-566-7805

residents enrolled in a doctoral degree program or postdoctoral fellowship program in cancer epidemiology.

Cancer Prevention This concentration provides students with a knowledge of the science of cancer prevention, expertise in a specialized research area, skill in policy analysis, and an introduction to professional networks through which they will be able to update continuously their knowledge of this evolving field. Social and behavioral scientists enrolled in the program prepare themselves to advance knowledge of the efficiency and effectiveness of alternative strategies for inducing behavioral change at the individual, institutional, community, or policy levels. Physicians prepare themselves for careers as clinical investigators or public health practitioners specializing in cancer prevention. The program combines the interdisciplinary resources of the school's Center for Cancer Prevention and of the Division of Cancer Epidemiology and Control in the Dana-Farber Cancer Institute.

Financial support may be available through the National Cancer Institute for doctoral students in the social and behavioral sciences, physicians engaged in postdoctoral training, and postdoctoral fellows in the social and behavioral sciences. Candidates must be US citizens or permanent residents.

Cardiovascular Epidemiology This concentration provides training in research methodology and the epidemiology of cardiovascular diseases. Doctoral students conduct research in a substantive or methodological area related to cardiovascular epidemiology. Research traineeships may be available through Harvard Medical School for students interested in cardiovascular disease or aging; candidates must be US citizens or permanent residents who are enrolled in a degree program in epidemiology.

Clinical Epidemiology This concentration is designed primarily for clinicians and other health care professionals who wish to develop the quantitative and analytic skills needed for clinical research. Students in this concentration take core courses in epidemiology and biostatistics to develop basic skills in study design and analysis that will allow them to examine clinical questions related to the diagnosis and treatment of disease. Additional courses in epidemiology and courses offered by other departments address related topics such as health status and quality of life measurement, decision analysis, cost-effectiveness analysis, health services research, and quality improvement of health care.

While all requirements for this concentration may be met by taking courses offered during the regular academic year (fall and spring semesters), requirements for the two-semester Master of Science (SM) degree may also be fulfilled by taking the summer courses offered through the Program in Clinical Effectiveness (see page 79). Clinical Effectiveness students begin their program by taking a core set of courses during an initial summer period. They complete the program by taking advanced courses either during the regular academic year or during a second summer period. Alternatively, Clinical Effectiveness students who only take courses during two summer periods can satisfy the requirements for this degree by completing a supervised research project. The content of this project typically entails the design and implementation of a clinical study, the analysis of the resulting data, and the creation of a manuscript of suitable quality for publication.

Environmental Molecular Epidemiology An interdisciplinary doctoral program in Environmental Molecular Epidemiology, to be administered through the Department of Environmental Health, is expected to be offered in fall 1996. See page 30 for more information about the program.

Environmental/Occupational Epidemiology This concentration is closely associated with the program in Environmental Epidemiology in the Department of Environmental Health. Students in this program take courses in epidemiology, environmental health, occupational health, biostatistics, and toxicology. Doctoral students conduct research in a substantive or methodologic area related to environmental or occupational health.

Financial assistance may be available for individuals who plan to pursue research and teaching careers in environmental and/or occupational epidemiology. Candidates for these traineeships must be US citizens or permanent residents enrolled in a doctoral program or postdoctoral fellowship program in epidemiology, environmental health, or occupational health.

Department chair Dimitrios Trichopoulos, left, with associate professors Marlene Goldman and Chung-Cheng Hsieh.

Epidemiologic Methods This concentration provides training in the development and application of new methods in epidemiologic research. Through courses offered by the Department of Epidemiology, students learn to use and justify classical epidemiologic methods in study design, data analysis, and interpretation of results. Through courses offered by the Department of Biostatistics, students receive training in biostatistical areas most relevant to epidemiologic research. Through advanced course work and tutorials, students are introduced to recent innovations in epidemiologic methodology. Doctoral students conduct research with faculty specializing in the development of new methodologies and in novel applications of existing methodologies to important data sets in epidemiology. Students pursuing this concentration ordinarily have completed four semesters of college calculus and one semester of linear algebra prior to enrolling in the program.

Infectious Diseases This concentration is designed to familiarize students with the epidemiology and biology necessary to understand the interactions of infectious agents, their hosts, and their vectors. Social and cultural aspects of infectious diseases and of related health services are covered, as are new and resurgent infectious diseases. Students in this concentration take courses in the departments of Epidemiology, Tropical Public Health, and Population and International Health. More advanced topics of infectious disease epidemiology are covered in tutorials with faculty specializing in this area (Freeman, Hunter, Mann, and Wilson).

Molecular Epidemiology This concentration introduces students to the application of molecular methods to epidemiologic studies. These methods may be useful as measures of exposure, disease susceptibility, or disease outcome. A range of relevant courses are available, as are research opportunities, particularly in association with the Department of Environmental Health, the Dana-Farber Cancer Institute, and the Joslin Diabetes Clinic.

Oral and Dental Health Epidemiology This concentration prepares dentists and others interested in oral diseases for research and teaching careers in epidemiology with an emphasis on oral epidemiology and dental health. Students follow the required curriculum in epidemiology with additional course work in oral biology and the epidemiology of oral and dental diseases. Students also participate in field research activities, case control studies of oral health risk factors, and clinical trials assigned to test preventive, diagnostic, or therapeutic interventions. Funding may be available for US citizens or permanent residents enrolled in the doctoral program. The program is jointly administered with the Department of Oral Health Policy and Epidemiology in the Harvard School of Dental Medicine.

For more information about programs in Epidemiologic Methods, please contact James M. Robins, MD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0206
Fax: 617-566-7805
E-mail: robins@sph.harvard.edu

For more information about programs in Infectious Diseases, please contact Jonathan Freeman, MD, SD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4558
Fax: 617-566-7805

For more information about programs in Molecular Epidemiology, please contact David J. Hunter, MB, BS, SD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2755
Fax: 617-432-0335
E-mail: nhdjh@gauss.med.harvard.edu

For more information about programs in Oral and Dental Health Epidemiology, please contact Chester Douglass, DMD, PhD, Harvard School of Dental Medicine, 188 Longwood Avenue, Boston, MA 02115.
Phone: 617-432-1456
Fax: 617-432-0047

For more information about programs in Pharmacoepidemiology, please contact Alexander M. Walker, MD, DPH, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4565
Fax: 617-566-7805

For more information about programs in Psychiatric Epidemiology, please contact Gwendolyn E. P. Zahner, PhD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1055
Fax: 617-566-7805

For more information about programs in Reproductive Epidemiology, please contact Marlene B. Goldman, SD, Department of Epidemiology, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4586
Fax: 617-566-7805

Faculty

Department Chair: Dimitrios V. Trichopoulos, MD (University of Athens), SM (Harvard University); Vincent L. Gregory Professor of Cancer Prevention, Professor of Epidemiology, and Director of the Center for Cancer Prevention. Cancer epidemiology.

Alberto Ascherio, MD (University of Milan), Diploma (London School of Hygiene and Tropical Medicine), MPH, DPH (Harvard University); Assistant Professor of Nutrition and Epidemiology. Relation of dietary factors to the occurrence of human disease; health and human rights.

Lisa F. Berkman, MS, PhD (University of California, Berkeley); Professor of Health and Social Behavior and Epidemiology. Social epidemiology; epidemiology of aging.

E. Francis Cook, MA (University of Massachusetts), SM, SD (Harvard University); Associate Professor of Epidemiology. Epidemiologic methods; clinical epidemiology.

Marlene B. Goldman, SM, SD (Harvard University); Associate Professor of Epidemiology. Reproductive health; cancer epidemiology.

Chung-Cheng Hsieh, MPH (National Taiwan University), SM, SD (Harvard University); Associate Professor of Epidemiology. Statistical methods; cancer epidemiology.

David J. Hunter, MB, BS (University of Sydney), MPH, SD (Harvard University); Associate Professor of Epidemiology. Cancer epidemiology; epidemiology of AIDS.

A member of the HSPH Working Group on New and Resurgent Diseases, Assistant Professor Mary Wilson is interested in the web of factors determining the geographic spread of infectious diseases.

Pharmacoepidemiology This concentration is designed for those interested in studying the frequency and determinants of both unintended and expected effects of drugs and medical devices. Studies of the pattern of utilization of drugs and devices, cost-benefit and risk-benefit analyses, and investigation of the distribution of diseases possibly amenable to medical intervention represent important secondary themes. The Department of Epidemiology offers an intermediate-level course in pharmacoepidemiology, a course in the theory and use of large data resources, and a variety of ongoing research projects. Relevant courses elsewhere in the school cover such areas as clinical trials, meta-analysis, drug regulatory affairs, decision analysis, and vaccine development. Students in the pharmacoepidemiology program have the opportunity to attend courses and congresses outside the school and are encouraged to undertake internships of up to three months in pharmaceutical firms or regulatory agencies. Students in this concentration ordinarily have a prior degree in medicine or pharmacy. Others are expected to acquire substantially equivalent expertise in areas related to their research. Financial support may be available for doctoral students pursuing thesis research.

Psychiatric Epidemiology This concentration introduces students to concepts and methods for studying the genetic and psychosocial factors that relate to the prevalence, incidence, and outcome of different types of psychiatric illnesses. Emphasis is given to issues of reliability and validity in studying such disorders among children, adolescents, and adults. The curriculum consists of six specialized courses as well as related courses offered in the Departments of Epidemiology and Biostatistics. Funding may be available through the National Institute of Mental Health for doctoral and postdoctoral traineeships in epidemiologic and statistical methods as applied to the study of psychiatric disorders; eligible students typically hold degrees in medicine, biological or social sciences, or quantitative methods, and must be US citizens or permanent residents.

Reproductive Epidemiology This concentration prepares students for research and teaching careers in epidemiology with a special emphasis on reproductive health in women and men. A wide range of relevant courses are available in the areas of epidemiology, biostatistics, environmental health (including exposure assessment and occupational health), infectious diseases, and population and international health.

Master of Science in Epidemiology (four-semester program)

The master's programs provide students with basic skills in epidemiologic and quantitative methods and in computing, in preparation for research or academic careers. The four-semester (80-credit) SM program is designed for individuals who hold a bachelor's degree and have a strong background in biology and mathematics. In addition to epidemiology and statistics courses, students study the basic medical sciences and the biological aspects of public health problems. The program is primarily intended for students who expect to continue toward a doctoral degree.

Required courses include EPI 200a, *Introduction to Epidemiology;* EPI 202b, *Elements of Epidemiologic Research;* EPI 203c, *Design of Case-Control and Cohort Studies;* EPI 204d, *Analysis of Case-Control and Cohort Studies;* BIO 200ab, *Introduction to Statistical Methods,* or BIO 201ab, *Principles of Biostatistics;* and BIO 210cd, *The Analysis of Rates and Proportions.* Recommended courses include EH 205ab, *Human Physiology;* BIO 211cd, *Regression and Analysis of Variance in Experimental Research;* BIO 213ab, *Applied Regression for Clinical Research;* BIO 216cd, *Applied Survival Analysis;* BIO 220ab, *Introduction to Statistical Modeling and Data Analysis;* BIO 221cd, *Discrete Multivariate Analysis;* CB 212ab, *Introduction to Cancer Biology;* TOE 204ab, *Principles of Toxicology;* DBE 208cd, *Pathophysiology of Human Disease;* and ID 265bc, *Practice of Quantitative Methods.*

Master of Science in Epidemiology (two-semester program)

The two-semester (40-credit) SM provides students with basic skills in epidemiologic and quantitative methods and in computing, in preparation for research or academic careers. Required courses include EPI 200a, *Introduction to Epidemiology;* EPI 202b, *Elements of Epidemiologic Research;* EPI 203c, *Design of Case-Control and Cohort Studies;* EPI 204d, *Analysis of Case-Control and Cohort Studies;* BIO 200ab, *Introduction to Statistical Methods,* or BIO 201ab, *Principles of Biostatistics;* and BIO 210cd, *The Analysis of Rates and Proportions.* The remainder of the schedule reflects areas of special interest and may include supervised research. The two-semester program is open to applicants with a medical degree or master's-level background in biology.

Doctor of Science in Epidemiology/ Doctor of Public Health

The doctoral programs are designed for students who plan careers in epidemiologic research or teaching or for those who aspire to leadership roles in the health professions. Applicants to the SD program should hold at least a bachelor's degree and have a strong background in biology and mathematics. For these individuals, the degree generally takes four to five years to complete; candidates with relevant doctoral degrees may complete the program in three years. The DPH degree is available to students holding a prior doctorate and an MPH degree.

Course requirements are the same as for the SM program, with the addition of EPI 205ab, *Practice of Epidemiology;* EPI 207b, *Advanced Epidemiologic Methods;* EPI 227d, *Principles of Screening;* and for non-physicians, EH 205ab, *Human Physiology,* and DBE 208cd, *Pathophysiology of Human Disease.* In addition, 10 credits are required in substantive courses offered by the department (EPI 211cd through EPI 290s), 10 credits in biostatistics above the level of BIO 201ab, and 10 credits in a second minor field.

Unless courses equivalent to those described for the master's program have been taken previously, most of the first two years is devoted to course work. Subsequently, doctoral candidates must pass the departmental written examination and the school-wide oral qualifying examination; complete, defend, and submit a thesis; and gain experience in teaching and research.

Faculty

Camara P. Jones, MD (Stanford University), PhD (Johns Hopkins University); Assistant Professor of Health and Social Behavior and Epidemiology. Development and application of epidemiologic methods to explore social stresses associated with racism, and the development and evaluation of interventions to ameliorate these stresses.

Frederick P. Li, MD (University of Rochester), MA (Georgetown University); Professor of Clinical Cancer Epidemiology; Professor of Medicine, Harvard Medical School. Inherited susceptibility to cancer; clinical and molecular epidemiology; cancer syndromes.

Jonathan M. Mann, MD (Washington University), MPH (Harvard University); François-Xavier Bagnoud Professor of Health and Human Rights, Professor of Epidemiology and International Health, and Director of the François-Xavier Bagnoud Center for Health and Human Rights. AIDS, HIV infection, and communicable disease epidemiology; health and human rights; epidemiology and health policy.

Richard R. Monson, MD, SM, SD (Harvard University); Professor of Epidemiology (Environmental Health and Epidemiology) and Director of the Educational Resource Center for Occupational Safety and Health. Relationship between the workplace, the environment, and disease; causes of abnormalities of pregnancy.

Nancy E. Mueller, SM, SD (Harvard University); Professor of Epidemiology. The role of viruses in the etiology of cancer; cancer epidemiology.

Lucas M. Neas, MSE (West Virginia College of Graduate Studies), SD (Harvard University); Assistant Professor of Environmental Health and Epidemiology. Environmental determinants of respiratory symptoms and pulmonary function; longitudinal studies of acute responses to environmental contaminants; environmental risk factors for breast cancer.

Eric B. Rimm, SD (Harvard University); Assistant Professor of Epidemiology and Nutrition. Relation of dietary factors to the occurrence of human diseases, in particular cardiovascular disease; development of nutritional epidemiological methods to study these associations.

Faculty

James M. Robins, MD (Washington University); Professor of Epidemiology and Biostatistics. Development of analytic methods for drawing causal inferences from complex observational and randomized studies with time-varying exposures or treatments.

Donna L. Spiegelman, SM, SD (Harvard University); Associate Professor of Epidemiology and Biostatistics. Binary data models with measurement error and misclassification in model covariates; design of studies with such data features; applications of biostatistics to epidemiology, particularly nutritional, occupational, and environmental data problems.

Meir J. Stampfer, MD (New York University), MPH, DPH (Harvard University); Professor of Epidemiology and Nutrition. Cardiovascular disease; dietary etiologies of chronic diseases, especially cancer, heart disease, and diabetes; health effects of oral contraceptives and post-menopausal hormones.

Sherri O. Stuver, SD (Harvard University); Assistant Professor of Cancer Epidemiology. Cancer epidemiology; virus-associated disease.

Alexander M. Walker, MD, MPH, DPH (Harvard University); Professor of Epidemiology. Pharmacoepidemiology; study design for observational research.

Walter C. Willett, MD (University of Michigan), MPH, DPH (Harvard University); Fredrick John Stare Professor of Epidemiology and Nutrition; Professor of Medicine, Harvard Medical School. Relation of dietary factors to the occurrence of human disease, in particular heart disease and cancer; development of methods to study these associations in epidemiological settings.

Gwendolyn E. P. Zahner, SM (Harvard University), PhD (Yale University); Assistant Professor of Epidemiology. Psychiatric epidemiology.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School, unless otherwise indicated.

Julie E. Buring, MS (University of Washington), SD (Harvard University); Associate Professor in the Department of Epidemiology. Epidemiology of chronic disease, primarily cardiovascular disease and cancer; teaching of epidemiology.

Courses Offered by the Department of Epidemiology, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information. Either EPI 200 or EPI 201 satisfies the school-wide requirement for an introductory course in epidemiology; however, individual programs may require one or the other.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

EPI 200a. Introduction to Epidemiology (Cook)
Covers principles and methods used in epidemiologic research. Designed for students majoring in epidemiology or biostatistics, or who desire a more detailed introduction to the main issues encountered in the design, implementation, and analysis of epidemiologic studies. (2.5 credits)

EPI 201. Principles of Epidemiology
EPI 201a. (M. Goldman, Stuver)
EPI 201s. (Stuver, Hankinson)
Introduces basic principles and methods of epidemiology. Lectures are complemented by seminars devoted to exercises or to the discussion of current epidemiologic studies. (2.5 credits)

EPI 202b. Elements of Epidemiologic Research (Spiegelman, Trichopoulos)
Introduces elements of study design, data analysis, and inference in epidemiologic research. May serve as an introduction to more advanced study or as a concluding course for those desiring a working knowledge of epidemiologic methods. (2.5 credits)

EPI 203c. Design of Case-Control and Cohort Studies (A. Walker)
Examines common problems in the design, analysis, and interpretation of cohort and case-control studies. Considers problems of exposure and disease definitions, time-dependent effects, confounding, and misclassification, and introduces relevant statistical methods. (2.5 credits)

EPI 204d. Analysis of Case-Control and Cohort Studies (Hsieh, Neas)
Develops material presented in EPI 203c into the rationale and methodology for mathematical modeling of study parameters. Emphasizes Poisson and logistic regression. (2.5 credits)

EPI 205ab. Practice of Epidemiology (Stampfer, Rimm, Colditz)
Requires students to present and discuss plans for collection and analysis of epidemiologic data. Preparatory work is done under tutorial arrangements with members of the faculty. Emphasizes conceptual issues rather than execution. (2.5 credits)

EPI 207b. Advanced Epidemiologic Methods (Robins)
Reviews classic and current readings on methodologic topics in epidemiology. Topics include options in study design, confounding, modeling, measurement error, estimation of effect, causal inference with time-dependent exposures and confounder, and analytic methods. (2.5 credits)

EPI 208st. Introduction to Clinical Epidemiology (Cook, I. Lee)
Covers principles and methods used in traditional and clinical epidemiologic research. (5 credits)

EPI 211c. Reproductive Epidemiology (M. Goldman)
Applies principles of epidemiology to diseases and disorders of reproduction in women and men. Considers study design and methodology in studies of reproductive health. (1.25 credits)

EPI 212a. Epidemiology of Cardiovascular Diseases (Stampfer)
Reviews the epidemiology of chronic cardiovascular diseases. Presents demographic distribution and time trends of these diseases and discusses known risk factors. (1.25 credits)

EPI 213c. Epidemiology of Cancer (Mueller, Trichopoulos)
Reviews basic concepts and issues central to cancer epidemiology. Considers the descriptive epidemiology of cancer and discusses implications of the biology of cancer for identification of risk factors. (2.5 credits)

EPI 214d. Epidemiologic Analysis of Outbreaks and Infectious Diseases (Freeman, Platt)
Discusses the use of epidemiologic methods in analyzing outbreaks and investigating infectious diseases. Illustrates different types of problems and methods of analysis and stresses literature review and practical methodology. (2.5 credits)

EPE 215cd. Environmental and Occupational Epidemiology (Dockery, Neas, Xu)
Presents methods for evaluating health effects of physical and chemical agents in the environment, reviews evidence on the health effects of such exposures, and considers resulting policy questions. (2.5 credits)

EPI 217a. The Epidemiology of Major Psychiatric Disorders (Tohen)
Covers classical and recent readings on the occurrence and distribution of psychiatric illness. Describes the application of basic epidemiologic research designs to the study of psychiatric conditions. (2.5 credits)

EPI 218b. Risk Factors in Psychiatric Epidemiology: Genetics and Environment (Zahner, Santangelo, Tsuang)
Reviews research methodology and empirical studies of genetic and psychosocial risk factors for psychiatric disorders. Topics include twin studies, brain imaging, and psychosocial risk factors. (2.5 credits)

EPI 219c. Assessment Concepts and Methods in Psychiatric Epidemiology (Zahner, Blacker)
Presents the application of basic epidemiologic and psychometric concepts and methods in psychiatric research. Topics include measurement theory, reliability, validity, screening, and diagnostic classification procedures. (2.5 credits)

EPI 220d. Psychiatric Screening and Diagnostic Tests (Murphy)
Focuses on interview schedules designed to identify psychiatric disorders and to provide diagnoses. Provides practical experience in administering and analyzing responses to diagnostic interviews and screening measures. (2.5 credits)

EPI 221d. Pharmacoepidemiology (A. Walker)
Covers inference about the effects of pharmaceuticals from case reports, case series, vital statistics and other registration schemes, cohort studies, and case-control studies. (2.5 credits)

EPI 222d. Genetic Epidemiology of Diabetes and its Complications (Krolewski, Warram)
Uses the genetics of diabetes and its complications, together with the descriptive epidemiology of these conditions, to illustrate the process of generating etiologic hypotheses that can be studied by the methods of genetic epidemiology. (2.5 credits)

EPH 224a. Cancer Prevention (Colditz, Li, Sorensen)
Introduces cancer prevention and control from a broad range of disciplines. Covers epidemiology and biology of cancer, approaches to prevention through behavior change, and models of behavior change. (2.5 credits)

EPI 225c. Epidemiology of Infectious Diseases (Freeman)
Covers basic concepts and issues central to the epidemiology of infectious diseases. Topics include properties of infectious agents and the nature of host defenses, the dynamics of occurrence of communicable diseases, and the relation between human behavior and the actions of governments. (2.5 credits)

EPI 226b. Managing Epidemiologic Data (Hunter)
Teaches general principles of data management for epidemiologic surveys and analytic studies. Students use the microcomputer package EPIINFO to replicate the experience of conducting a case-control study from questionnaire design through to analysis. (1.25 credits)

EPI 227d. Principles of Screening (Colditz, Kawachi)
Provides a basic understanding of the principles of screening. Emphasizes screening for cancer and applications in other settings. Students develop strategies to evaluate new screening tests and critique a screening policy. (2.5 credits)

EPI 228bc. Oral Epidemiology (Douglass)
Discusses the principal measures and methods of epidemiology as they apply to oral conditions; the distribution, etiology, and risk factors for a number of these conditions; and links between oral epidemiologic data and health policy issues. (2.5 credits)

Faculty

Graham A. Colditz, MB, BS (University of Queensland), MPH, DPH (Harvard University); Associate Professor in the Department of Epidemiology. Diet and chronic diseases; behavioral epidemiology.

Chester W. Douglass, DMD (Temple University), MPH, PhD (University of Michigan); Professor in the Department of Epidemiology. Primary affiliation: Harvard School of Dental Medicine. Oral epidemiology; health policy.

Robert H. Fletcher, MD (Harvard University), MSc (Johns Hopkins University); Professor in the Department of Epidemiology. Clinical epidemiology.

Suzanne W. Fletcher, MD (Harvard University), MSc (Johns Hopkins University); Professor in the Department of Epidemiology. Clinical epidemiology.

Jonathan Freeman, SM, SD (Harvard University), MD (Duke University); Assistant Professor in the Department of Epidemiology. Infectious diseases; nosocomial infections.

Charles H. Hennekens, MD (Cornell University), MPH, SM, DPH (Harvard University); Professor in the Department of Epidemiology. Epidemiology of cardiovascular disease, cancer, and infectious diseases.

Andrzej S. Krolewski, MD, PhD (Warsaw Medical School); Associate Professor in the Department of Epidemiology. Diabetes mellitus epidemiology.

I-Min Lee, MB,BS (National University of Singapore), MPH, SD (Harvard University); Assistant Professor in the Department of Epidemiology. Epidemiology of cancer; physical activity and fitness in relation to cancer incidence; health in minorities.

Jane M. Murphy, PhD (Cornell University); Professor in the Department of Epidemiology. Longitudinal studies of psychiatric epidemiology in general populations; assessment of psychiatric illness.

Johanna M. Seddon, MD (University of Pittsburgh), SM (Harvard University); Associate Professor in the Department of Epidemiology. Ophthalmology.

Daniel E. Singer, MA (Oxford University), MD (Harvard University); Associate Professor in the Department of Epidemiology. Preventive health care; effective, efficient health care.

Professor Alexander Walker heads the school's program in pharmacoepidemiology.

Faculty

Mauricio Tohen, MD (Universidad Nacional Autonoma de Mexico), MPH, PhD (Harvard University); Associate Professor in the Department of Epidemiology. Outcome studies in major psychoses; psychiatric nosology.

Ming T. Tsuang, MD (National Taiwan University), PhD (University of London); Professor in the Department of Epidemiology. Family studies of psychiatric disorders; genetics of mental illness.

Mary E. Wilson, MD (University of Wisconsin); Assistant Professor in the Departments of Population and International Health and Epidemiology. Infections acquired during travel and residence in tropical and developing countries; determinants of geographic distribution of infectious diseases; meta-analysis of BCG studies.

Adjunct Faculty

Hans-Olov Adami, MD, PhD; Professor of Cancer Epidemiology, University Hospital, Uppsala, Sweden.

Kin-Wei A. Chan, MB, MPH, SD; Assistant Director, Epidemiology and Statistics, CIBA-GEIGY Corporation, Pharmaceutical Division.

Anders Ekbom, MB, MD, PhD; Associate Professor of Surgery, University Hospital, Uppsala, Sweden.

Joseph F. Fraumeni, Jr., MD, ScM; Director, Epidemiology and Biostatistics Program, Division of Cancer Etiology, National Cancer Institute.

K. Malcolm Maclure, SM, SD; Epidemiologist, Ministry of Health, Province of British Columbia, Canada.

Ralph S. Paffenbarger, Jr., MD, DrPH; Professor of Epidemiology, Emeritus, Stanford University.

Kenneth J. Rothman, DMD, MPH, DPH; Professor, Departments of Epidemiology and Community Medicine, Boston University.

Susan L. Santangelo, ScD; Assistant Professor, Department of Psychiatry, New England Medical Center at Tufts University School of Medicine.

EPI 229b. Ophthalmic Epidemiology (Seddon)
Reviews the epidemiology of leading causes of blindness, including cataract, macular degeneration, glaucoma, and diabetic retinopathy. Considers results from all epidemiologic study designs. (1.25 credits)

EPI 232b. Distribution of Infectious Diseases in Time and Space (Wilson)
Examines factors that influence the appearance, dissemination, frequency, and disappearance of infectious diseases in an area or population, including transmission mechanisms, migration, and climatic, environmental, and demographic changes. (2.5 credits)

EPI 236s. Advanced Methods in Clinical Epidemiology (Cook)
Examines design, measurement, and analytic issues encountered in clinical research. Focuses on analytic techniques such as stratification, multivariate modeling, and recursive partitioning. (5 credits)

EPI 237t. Advanced Applications in Clinical Epidemiology (I. Lee, Cook)
Provides practical guidance for developing a clinical research agenda. Complements EPI 208s. (2.5 credits)

EPI 241d. Clinometrics (Cook, I. Lee)
Examines methodologic issues related to measures of health status encountered in clinical research, including generic and disease-specific measures of health, quality of life, functional status, severity of disease, and co-morbidity. (2.5 credits)

EPI 242abcd. Seminar in Clinical Epidemiology (I. Lee, Cook, Orav)
Draws on presentations by guest speakers to expose students to a number of clinical research projects and a variety of research designs and analytic strategies. Faculty members summarize methodologic issues pertinent to the presentations. (2.5 credits)

EPI 250c. Studies in Molecular Epidemiology (Hunter)
Acquaints students with recent developments in molecular epidemiology, including molecular markers of environmental exposures, applications to risk assessment, and genetic markers of susceptibility. Applications cover cancer, cardiovascular disease, and infectious diseases. (1.25 credits)

EPI 251b. Molecular Epidemiology of Cancer (Li)
Offers an overview of the molecular genetics and epidemiology of cancer, emphasizing the use of new laboratory techniques in epidemiologic studies. Discusses the application of epidemiologic methods to the analysis of clinical case studies in cancer. (1.25 credits)

EPI 252d. Epidemiology of Virus-Associated Malignancy (Mueller, Stuver)
Reviews the epidemiology and public health impact of virus-associated malignancy. Discusses the role of host response and the use of serology and viral probes as risk markers. (1.25 credits)

EPI 283f. Topics in Cancer Epidemiology (Mueller, Fraumeni)
Reviews key papers in cancer epidemiology, emphasizing study design issues. Discusses current research activities conducted by the US government. (1 credit)

EPI 290s. Diagnosis of Major Psychiatric Disorders in a Clinical Setting (Tohen, Vuckovic)
Familiarizes students with a contemporary biomedical approach to psychiatric practice through a summer rotation in a clinical psychiatric setting. Emphasizes both clinical epidemiologic research and diagnosis of major psychiatric disorders. (2.5 credits)

EPI 310abcdefst. Research in Clinical Epidemiology (Cook, I. Lee)
Fulfills the clinical research requirement for students concentrating in Clinical Epidemiology who intend to complete the requirements for the SM during summer study. Requirements include a written paper and an oral presentation summarizing a research project undertaken at the student's home institution. (10 credits)

Tutorial Programs

Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or to undertake specialized readings or studies.

DEPARTMENT OF HEALTH AND SOCIAL BEHAVIOR

The mission of the Department of Health and Social Behavior is to advance and apply new knowledge from the social and behavioral sciences to the solution of pressing public health problems. The department is working to understand the social and behavioral factors that challenge the health of populations and to develop social and behavioral interventions that can improve health and the quality of life.

TinhVan Diep
SM/Health and Social Behavior

Teaching nutrition classes for low-income Californians set the stage for TinhVan's future course of study at HSPH. "I had this curriculum that wasn't working for the participants, and I didn't know how to change it. Now, I'm looking into the whole process of developing health education curriculum materials," she says. This year she completed a project on health education that took her to Boston's Chinatown, where she documented how an English as a Second Language instructor developed a series of mental health workshops. "I'm hoping that I can also design health education programs for ESL and adult learners," says TinhVan, who foresees a career in health promotion at a community health center, an adult education center, or a public health agency.

"Eventually, I'd like to be able to work in the international arena, but my home is in the Bay Area of California right now, where there are a lot of immigrants from different countries."

As both a philosophical stance and a practical reality, the Department of Health and Social Behavior views health behavior in relation to its social context. Work is therefore anchored in social settings, such as communities, schools and colleges, workplaces, and health care delivery systems. Members of the department have ongoing research projects in each of these settings, organized by risk behaviors (smoking, drinking, drug abuse, diet, physical activity), by disease (cancer, cardiovascular disease, arthritis, asthma, AIDS), and/or by target population (children, adolescents, workers, low-income groups). Recognizing the importance of public health communication, the department also emphasizes the role of interpersonal, small group, written, and mass media communications in all of its work.

The department's educational mission is to train both scholars and practitioners: scholars whose research will illuminate basic social mechanisms that affect health and who will identify and test innovative social interventions, and practitioners who are skilled in designing, implementing, and evaluating health-enhancing interventions in action settings and who appreciate the social ecology of health behavior and social and policy leverage points.

All students in Health and Social Behavior are required to take (at minimum) the school-wide requirements in biostatistics and epidemiology; students in SM programs must also fulfill core requirements in environmental health and health policy/management. In addition, the department requires two core courses: HSB 200a, *Social and Behavioral Dimensions of Public Health,* and HSB 201a, *Society and Health.* Beyond these core requirements, students may wish to concentrate their work on the conceptual models of relationships between social forces and health, on the design and evaluation of interventions for healthful change, and/or on health communication issues and approaches. Students are

Henry Wechsler (center) and his colleagues George Dowdall (left) and Charles Deutsch study the problem of binge drinking on college campuses.

For more information about programs in Health and Social Behavior, please contact Rima Rudd, ScD, Director of Educational Programs, Department of Health and Social Behavior, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1135
Fax: 617-432-3755

urged to work closely with their advisors to delineate education and career goals and plan a course of study. To facilitate this effort, the department has identified three general tracks of study. Each year, the department offers several courses and tutorial opportunities in each of these areas of concentration.

Social Determinants of Health This concentration focuses on analysis of the major social variables that affect the health of populations. Seminars, tutorials, and courses enable students to explore a range of health consequences of various social factors by studying varied subgroups, at different times and places, under diverse and changing conditions. Students examine mechanisms and processes through which social factors exert their impact, as well as mechanisms that mediate or moderate relationships between social factors and health outcomes. At least one advanced seminar is offered each year which features a rigorous examination of social and behavioral theory.

Program Design and Planned Social Change This concentration focuses on the application of theory in the design of intervention programs as well as on research and evaluation methodology. Attention is given to the following design steps: problem diagnosis, assessment, formative research, program design, and evaluation. The social settings for interventions may include communities, workplaces, schools and colleges, and health care facilities. Populations of interest include those who are underserved, marginalized, and in special need, and targeted populations may be segmented by age, gender, socioeconomic status, ethnicity, and geographic location. Intervention strategies include community organizing and improvement, social marketing, communication, adult learning approaches, and advocacy.

Health Communications This concentration focuses on communication theory and its application to health education and promotion. Health communications is a fundamental aspect of public health practice and is a key component of the department's work in major social settings. This work includes attention to interpersonal communication, small group work, literacy, and mass communications. The department sees public health communications as an important skill, as the foundation of dialogue, and as a mechanism for advancing policy change, addressing social norms, and promoting individual behavior change. The role of interpersonal and media communication is emphasized in much of the department's research and teaching.

As described below, the department offers both a four-semester and a two-semester Master of Science (SM) program, as well as a program leading to the Doctor of Science (SD) or Doctor of Public Health (DPH) degree. Please refer to page 7 for information about the Master of Public Health concentration in Public Management and Community Health.

Master of Science in Health and Social Behavior (four-semester program)

The four-semester master's program prepares students for work in a variety of community, public, and private settings with a focus on program design, supervision, and evaluation, and for work as members of research teams. For example, one recent graduate focuses on the implementation and evaluation of social marketing programs; another is a member of a research team examining measurement issues related to quality of life.

Students enter the four-semester program with a background (often a major) in the social/behavioral sciences and experience in the field.

Of the 80 credits necessary to earn the four-semester SM, at least 20 must be earned in departmental courses. Students in this program

must also fulfill core requirements in biostatistics, epidemiology, environmental health, and health policy/management. Students are encouraged to delineate professional goals and to develop an area of expertise. They often focus on a subject area (such as AIDS, addiction, cardiovascular risk reduction, environmental health) and/or a skill area (such as program design, program evaluation, communication, marketing). Master's students are encouraged to declare an area of concentration within Health and Social Behavior and to complete an internship as part of their training.

Master of Science in Health and Social Behavior (two-semester program)

The two-semester master's program also prepares students for work in a variety of community, public, and private settings with a focus on program design, supervision, and evaluation, and for work as members of research teams. One recent graduate is serving as the evaluator on a violence prevention program for adolescents; another works with a nonprofit organization coordinating international efforts related to women's health.

Students enter the two-semester program with a graduate degree in a related field.

Of the 40 credits necessary to earn the two-semester SM, at least 15 must be earned in departmental courses. Students are encouraged to focus their work in a specific content or skill area. They should work closely with their advisors to develop a study plan early in the fall semester.

Doctor of Science in Health and Social Behavior/Doctor of Public Health

The doctoral programs train students as scholars and researchers who will identify new social and behavioral risks, will test innovative social interventions, and as practitioners who will design, implement, and evaluate health-enhancing interventions. Recent graduates are working in research and academic settings.

All students enter the doctoral programs with a strong foundation in the social and behavioral sciences and with an earned master's degree.

Students must fulfill the residency requirements and complete course work by taking a minimum of 40 credits in graduate-level courses, distributed over one major (a minimum of 20 credits within Health and Social Behavior) and two minor fields (a minimum of 10 credits in each field). They are expected to augment the basic requirements in epidemiology and biostatistics with substantial course work appropriate for a research orientation. In addition, students are required to take the following departmental courses: HSB 270cd, *Doctoral Seminar on Health and Social Behavior* (taken each year of study), and either HSB 230cd, *Social and Behavioral Research Methods*, or an equivalent course.

Doctoral candidates must pass the departmental written examination and the school-wide oral qualifying examination and must complete, defend, and submit a thesis based on original research.

Courses Offered by the Department of Health and Social Behavior, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

ID 230b. Society and Health: Health of Community Populations (Gortmaker, Wise)
Focuses on diseases affecting persons living in or near poverty in the urban US. Considers the impact of socioeconomic, cultural, and environmental factors and explores types of data that can be used to identify community health problems. Targeted toward those with interests in biostatistics, epidemiology, health policy, and management. (2.5 credits)

HSB 200a. Social and Behavioral Dimensions of Public Health (Rudd)
Introduces important behavioral science concepts and insights useful in the design, implementation, and evaluation of change strategies to advance health. Introduces the research agenda of HSB with attention to the theoretical and conceptual frameworks from sociology and social psychology and their application to public health problems. (2.5 credits)

Faculty

Department Chair: Lisa F. Berkman, MS, PhD (University of California, Berkeley); Professor of Health and Social Behavior and Epidemiology. Social epidemiology; epidemiology of aging.

H. William DeJong, MA, PhD (Stanford University); Lecturer on Health Communication. Use of mass media for health promotion; alcohol and tobacco control policies; drunk driving prevention; violence prevention; organ donation.

Karen M. Emmons, MA, PhD (State University of New York at Stony Brook); Assistant Professor of Health and Social Behavior. Health promotion; smoking, environmental tobacco smoke, and health; worksite and community-based interventions.

Thomas A. Glass, MA, PhD (Duke University); Assistant Professor of Health and Social Behavior. Psychosocial epidemiology; behavioral intervention models; gerontology; medical sociology.

Steven L. Gortmaker, SM, PhD (University of Wisconsin); Senior Lecturer on Sociology. Statistical evaluation methods; social class and infant and child health; obesity and television viewing; AIDS; chronic disease.

Camara P. Jones, MD (Stanford University), PhD (Johns Hopkins University); Assistant Professor of Health and Social Behavior and Epidemiology. Development and application of epidemiologic methods to explore social stresses associated with racism, and the development and evaluation of interventions to ameliorate these stresses.

Ichiro Kawachi, MB, ChB, PhD (University of Otago, New Zealand), DipCommH (College of Community Medicine of New Zealand); Assistant Professor of Health and Social Behavior. Prospective epidemiological investigation of social determinants of health functioning; international tobacco control and cardiovascular disease prevention.

Nancy Krieger, MS (University of Washington), PhD (University of California, Berkeley); Assistant Professor of Health and Social Behavior. Social inequalities in health, especially regarding race/ethnicity, social class, and gender; cancer, especially breast cancer; cardiovascular disease, especially hypertension; epidemiologic theory and history.

Faculty

Sol Levine, MA, PhD (New York University); Professor of Health Behavior (Health and Social Behavior and Health Policy and Management). Social determinants of health; social stress; quality of life; health professions and health organizations; health policy.

Rima E. Rudd, MSPH (University of Massachusetts), ScD (Johns Hopkins University); Lecturer on Health Education. Public health and adult education pedagogy; normative change and change strategies, including small group communications, community organizing, social marketing, and health and literacy.

Glorian Sorensen, MPH, PhD (University of Minnesota); Associate Professor of Health and Behavior. Cancer prevention in the workplace; intervention research in community and occupational settings.

Henry Wechsler, AM, PhD (Harvard University); Lecturer on Social Psychology. Alcohol and drug use and related high-risk behaviors among youth; epidemiologic, preventive, and public policy approaches to substance abuse prevention.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School, unless otherwise indicated.

Paul D. Cleary, MS, PhD (University of Wisconsin); Professor in the Department of Health and Social Behavior. Effectiveness of behavior change programs; design and use of patient reports on the quality and outcomes of medical care.

Lawren H. Daltroy, MPH (University of Michigan), DrPH (Johns Hopkins University); Assistant Professor in the Department of Health and Social Behavior. Application of social psychology and decision-making theory to patient education in chronic disease; functional status measurement in arthritis.

Thomas S. Inui, MD, ScM (Johns Hopkins University); Professor in the Department of Health and Social Behavior. Primary care effectiveness; health-related behavior; clinical prevention.

HSB 201a. Society and Health (Kawachi, Levine)
Analyzes major social variables that affect population health: poverty, social class, gender, race, family, community, work, behavioral risks, and coping resources. Examines health consequences of social and economic policies, and the potential role of specific social interventions. (2.5 credits)

HSB 202b. Innovative Strategies in Health Education (Rudd)
Highlights issues of control, participation, and empowerment with a focus on theory, design, and evaluation. Focuses on the development of theory-based health education strategies for change. (2.5 credits) Offered 1995-96 and alternate years.

HSB 203c. Social Origins/Control of Heart Disease (Kawachi)
Analyzes the major social variables (social class, work, social networks, gender, race) that have influenced the rise and fall of the 20th-century epidemic of cardiovascular disease. Uses epidemiological and sociological concepts to develop a new framework for preventive policy. (2.5 credits) Not offered 1995-96.

HSB 204a. Communication in Health Care Settings (Daltroy)
Focuses on theory and practice of health education in the clinical encounter: doctor-patient communication, patient education, adherence to medical regimen, cognition and behavioral skills in chronic disease co-management, informed consent, and psychoeducational preparation for surgery. (2.5 credits) Offered 1995-96 and alternate years.

HSB 205a. Teaching and Working with Groups (Rudd)
Uses role play and reflective analysis to help participants develop listening skills, experiment with activities that build group cohesion and trust, and focus on group maintenance as well as task-oriented roles. (2.5 credits)

HSB 206d. HIV, Transmission, and Social Behavior (Gortmaker)
Examines and analyzes behavior in light of the HIV epidemic in the US. Covers stigma, taboo, identity, sexual and drug-using behaviors, and the social construction and production of behavior. (2.5 credits)

HSB 207b. "Race" and Racism (Jones)
Explores the roles of "race" and racism in relation to health outcomes in the US. Topics include the history of the concept of "race," the use of "race" in scientific research, and the role of "race" as a social risk factor. (2.5 credits)

HSB 208d. Public Health Practice for Social Change (Rudd, Ryan)
Builds on dialogues with innovative community leaders to explore approaches used in public health practice. Emphasizes the experience of grassroots activists and the challenges to effective and responsible public health practice posed by social and economic inequalities. (2.5 credits) Not offered 1995-96.

HSB 209b. Social Psychology and Health Behavior (Daltroy)
Examines theories of social psychology that have been used to explain and predict health behaviors and to develop programs to change them. Focuses on social cognitive theory, expectancy-value theories, attribution theory, and decision-making theory, and emphasizes application to public health practice. (2.5 credits) Not offered 1995-96.

HSB 210d. Principles for Designing Health Interventions (Rudd, Daltroy)
Introduces program planning models for health interventions. Focuses on the planning process and includes an examination of individual, institutional, and community-related actions and decisions for healthful change. (2.5 credits)

HSB 211b. Health Promotion through the Mass Media (DeJong)
Covers the development of public communication campaigns in the field of health promotion: assessing the mass media's potential for health promotion; designing mass communication materials consonant with behavioral science principles and the public health model; and executing a media campaign. (2.5 credits)

HSB 212cd. Developing Radio Communications (DeJong)
Covers the development and use of radio communications in public health. Participants create an original radio commercial, moving from background research to scripting and final production. Includes trips to a recording studio and a radio station. (2.5 credits)

HSB 213b. Theoretical Approaches to Health Behavior Change (Emmons)
Explores theoretical perspectives on health-related behavior change, including protection motivation theory, transtheoretical model, expectancy-value theories, social cognitive theory, and prospect theory. Emphasizes measurement and application. (2.5 credits) Offered 1995-96 and alternate years.

HSB 214cd. Health and Literacy Practicum (Rudd)
Introduces linkages between health and literacy and between health and adult education theory and methods. Participants hone skills in materials assessment and group interviewing as they engage in structured field work. (5 credits)

HSB 217cd. Disaster Management (Pierce, Leaning)
Prepares those responsible for on-the-scene, immediate acute intervention during disasters by focusing on decision-making under stress. Examines case studies within the theoretical framework of disaster planning, response, and assessment. (2.5 credits)

HSB 218c. Organizational and Community Approaches to Health Promotion (Sorensen)
Examines health promotion/education intervention with a focus on organizations, worksites, and communities. Applies basic social science principles with emphasis on both individual and organizational approaches to health promotion and health behavior change. (2.5 credits)

HSB 220cd. An Introduction to High-Risk Behaviors: Epidemiology, Prevention, and Public Policy (Wechsler)
Examines behaviors that place an individual at higher risk of morbidity and mortality. Focuses on epidemiology of smoking, alcohol abuse, drug abuse, gambling, inactivity, lack of proper nutrition, violence, accidental injury, unsafe driving, and unsafe sex. (5 credits)

HSB 222c. Alcohol Abuse and Alcoholism from a Public Health Perspective (Wechsler)
Covers the nature and scope of alcoholism and alcohol abuse as a public health problem; patterns of use and abuse; diagnosis and medical complications; treatment; alcohol and the courts, the workplace, and the family; alcohol problems in primary medical care; drinking and driving; societal supports of drinking; and prevention and public policy. (2.5 credits)

HSB 226c. Gender and Health (Levine, Bird)
Focuses on the social determinants of gender differences in health. Topics include women's representation in medical research; health consequences of gender stratification in the workplace, of family roles, of exposure to violence against women; and gender differences in health behaviors and in the health consequences of social and economic policies. (1.25 credits)

HSB 230cd. Social and Behavioral Research Methods (Gortmaker)
Covers aspects of social and behavioral research methods, including research design, measurement, sampling, data collection, and testing causal theories. (5 credits)

HSB 249b. Approaches to International Tobacco Control (Kawachi, Emmons)
Prepares students to apply training in epidemiology, statistics, management, and policy to the development of public health programs to curb tobacco use. Teaches concepts and techniques for measuring smoking prevalence, attributable mortality, and economic costs. (2.5 credits) Offered 1995-96 and alternate years.

HSB 250b. Inequality and Health (Kawachi, Levine)
Reviews, from economic, political, and sociologic perspectives, the major theories of social stratification; examines the epidemiologic evidence on social class, gender, and racial disparities in health and illness; and develops an interdisciplinary approach to analyzing the problem of inequality. (2.5 credits) Not offered 1995-96.

HSB 270cd. Doctoral Seminar on Health and Social Behavior (Gortmaker)
Outlines the major questions pursued by contemporary researchers in the field, focusing on underlying theoretical frameworks. Provides a forum for doctoral students to discuss their research ideas and plans, including their theoretical perspectives. (1.25 credits)

HEH 282t. Outcomes Measurement (Inui, Tarlov, Cook)
Emphasizes concepts, methods, and measures for assessing patients' health status and outcomes of care. Reviews qualitative and quantitative approaches to understanding and assessing outcomes. Evaluates the application, content, and performance characteristics of important scales and indices. (2.5 credits)

HSB 290d. Advanced Seminar in Social Determinants of Health (Levine)
Focuses on theories and models from sociology, social psychology, and related disciplines that are useful for policy analysis and research. Helps students develop research topics. (2.5 credits)

Tutorial Programs, Field Experience
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research, undertake specialized readings, perform field projects, or carry out independent studies in the following areas: health-related quality of life, social aspects of chronic illness, social class and health (Levine); health inequalities, cardiovascular disease, social epidemiology (Kawachi); activity, inactivity, and obesity, AIDS-related studies, poverty and child health (Gortmaker); alcohol abuse, illicit drug use (Wechsler); health and literacy, social marketing, program evaluation, social change and change agents (Rudd); worksite health promotion, community-based cancer prevention (Sorensen); patient-provider communication (Daltroy); mass media studies, media advocacy and community development, mass communications studies (DeJong); qualitative research in community settings (Emmons).

Faculty

Jacqueline Barnes McGuire, MSc (University of Wisconsin), PhD (Institute of Education, London); Assistant Professor in the Department of Health and Social Behavior. Prevalence of behavior problems in and effects of intervention with young children; evaluation and conceptualization of dimensions of the community in relation to issues concerning children.

Chester M. Pierce, MD (Harvard University); Professor in the Department of Health and Social Behavior. Primary affiliation: Harvard Medical School and Graduate School of Education. Vocational counseling; extreme environments; cross-racial counseling, racism, and mass media.

Adjunct Faculty

Diana Chapman Walsh, MS, PhD; President, Wellesley College.

John E. Ware, Jr., MA, PhD; Senior Scientist, The Health Institute, New England Medical Center.

DEPARTMENT OF HEALTH POLICY AND MANAGEMENT

The Department of Health Policy and Management is a mission-oriented department concerned with improving the health care delivery system and mitigating public health risks in the United States and abroad. The department is dedicated to resolving major management and health policy problems through original research, advanced training, and dispute resolution.

Roberto Gnesotto
SM/Health Policy and Management

"I think this was the right program for me at this stage of my professional development," says Roberto, an Italian physician completing his master's degree in HPM. "I have been able to combine my twin interests in international health and management policies while gaining a better understanding of the political, economic, and cultural factors that influence the environment in which health systems must function."

Roberto has much international experience to reflect upon, having served as a district medical officer in war-torn Mozambique and in drought-stricken provinces in Ethiopia. "The conditions I faced taught me that you must deal with the factors that affect the long-term advancement of health in developing countries," he says. "You have to go beyond the level of what to do and how; you have to understand why governments make health policy decisions. Not many schools provide this instruction." Roberto will return to Mozambique and concentrate on rebuilding the country and designing new health care systems.

Research priorities of the Department of Health Policy and Management are organized in eight broad areas: *health financing and insurance*, including the creation of new physician payment systems and the design of public policies dealing with rising insurance premiums; *management of health hazards*, for example by using risk assessment to set priorities for environmental health protection; *management of health care organizations*, including the application of corporate strategic planning concepts to the challenges faced by health systems and pharmaceutical firms; *management and evaluation of medical technology*, including the meta-analysis of data from clinical trials; *business and labor in health*, including the negotiation of occupational safety and health care benefits in the collective bargaining process; *international health*, including evaluation of the cost-effectiveness of health programs in developing countries; *quality of health care*, including the design of better methods to measure quality; and *health care reform*, which includes the development of partnerships between the department and the corporate community to explore critical aspects of health policy and management.

The department's problem-solving orientation is exemplified by its strong ties with leading health practitioners in hospitals, HMOs, community health centers, health advocacy groups, corporate medical departments, health and environmental consulting firms, state and local health departments, legislative committees, federal regulatory agencies, and international agencies. Practical problem-solving skills are emphasized by an interdisciplinary faculty that includes management specialists, decision analysts, accountants, physicians, lawyers, policy analysts, economists, political scientists, and program evaluators.

The department has developed an effective job placement mechanism for its students which includes numerous contacts with potential employers on a national scale. A system of faculty

networking and professional contacts is used to link students with a broad range of health policy makers and executives. Practitioners are invited to the department to discuss their work and career paths.

As described below, the department offers both a four-semester and a two-semester Master of Science (SM) program, and participates in a university-wide Doctor of Philosophy (PhD) program in health policy, offered under the auspices of the Graduate School of Arts and Sciences. A department-based Doctor of Science (SD) program is under consideration for implementation in either September 1996 or 1997. Please refer to pages 7 and 8 for information about the Master of Public Health concentrations in Health Care Management, Public Management and Community Health, and Law and Public Health.

Master of Science in Health Policy and Management (four-semester program)

The four-semester SM program is designed for students who are building professional careers in health-related fields and who aspire to leadership roles in either the public or private sector. The program emphasizes professional skills and concepts, a solid grounding in the substance of health problems, rigorous quantitative training, and a curriculum which combines professional, academic, and clinical activities. Acquired knowledge is applied to practical situations through a required summer internship program and an applied field research program. Recent graduates have taken such positions as research analyst for the Health Care Committee of the Massachusetts House of Representatives, senior policy analyst for the Massachusetts Rate Setting Commission, health care consultant at Arthur D. Little, and manager of program evaluation for Private Health Care Systems. Others have gone on to doctoral programs in related fields.

Applicants come from a wide variety of undergraduate fields. They are expected to have work experience and an academic record, particularly in quantitative and analytical courses, that suggest outstanding potential in the areas of health policy and management. Applicants should have at least two years of relevant post-baccalaureate work experience in the health field; exceptions are occasionally made for outstanding candidates. Deferred admission is available for applicants who demonstrate strong potential but who lack sufficient professional experience in the health sector. These applicants work within the health field in positions approved by the program for a minimum of one year before matriculating.

Of the 80 credits necessary to earn the SM, required courses account for 30 to 35. All students take courses in epidemiology, statistics, environmental health, health and social behavior, and economics. In addition, students must satisfy the requirements of at least one of the five concentrations described below. The *Guide to the Two-Year Master of Science Program*, available from the department, describes each concentration's requirements and lists courses throughout the university that are pertinent to each concentration.

Management of Health Care Organizations This concentration is designed for students pursuing management careers in public or private sector health care institutions. The course work gives students a range of managerial skills, including planning, marketing, managed care, financial analysis, cost accounting, budgeting, strategic planning, information systems, operations management, payment systems, and organizational behavior, and tailors the use of these skills to the health care setting.

Required courses for the concentration include EPI 200a or 201a, introductory epidemiology; BIO 200ab or 201ab, introductory biostatistics; BIH 219c, *Multiple Regression Analysis for HPM*; HPM 205ab or 206ab, *Economic Analysis;* ID 250a, *Ethical Basis of the Practice of Public Health;* a course in both environmental health and health and social behavior; and HPM 290abcd, *Applied Research and Practice in HPM;* plus an additional 12.5 credits from a list of selected courses on management/analysis.

Management of Health Hazards This concentration is designed for students who wish to become involved in the formulation of disease and injury prevention policies for corporations, labor unions, public interest groups, public sector agencies, or legislative committees.

The Department of Health Policy and Management offers two-year postdoctoral fellowships to physicians and dentists who wish to do independent research in such areas as quality of medical care, technology assessment and cost-effectiveness, health care policy, management of health care organizations, and AIDS policy. The program emphasizes methodology in evaluation research, decision science, economics, and organizational analysis, and permits fellows to design individualized programs of study. Fellows may also apply for admission to a formal degree program.

Candidates must hold an MD, DDS, or equivalent degree, and must be US citizens or permanent residents. Applicants must submit a curriculum vitae, three letters of reference, and a statement describing career goals, research interests, and reasons for applying. The application deadline is November 1, 1995, for a fellowship beginning in July, 1996. For more information, contact Kristine L. Forsgard in the Department of Health Policy and Management.

For more information about SM and SD programs in Health Policy and Management, please contact Kristine L. Forsgard, Deputy Director of Academic Programs, Department of Health Policy and Management, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4511
Fax: 617-432-4494
E-mail: kforsgar@sph.harvard.edu

Associate Professor James Hammitt, whose research focuses on the design and evaluation of environmental policy, advises doctoral candidate Nancy Beaulieu.

Required courses for the concentration include EPI 200a or 201a, introductory epidemiology; BIO 200ab or 201ab, introductory biostatistics; BIH 219c, *Multiple Regression Analysis for HPM*; HPM 206ab, *Economic Analysis;* HPM 221ab, *Management in Public Health in Industrialized Countries;* a course in both environmental health and health and social behavior; and HPM 290abcd, *Applied Research and Practice in HPM*. The variety of recommended electives permits students to acquire additional skills in areas such as epidemiology and quantitative policy analysis and to develop specialties in specific health problems such as AIDS, substance abuse, environmental pollution, and injury control.

Health Financing and Insurance This concentration is designed for students who are planning careers in the private or public sector in which analytical skills in economics, accounting, and finance are critical to management or policy decisions. The concentration provides comprehensive instruction in all areas of health finance and insurance.

Required courses include EPI 200a or 201a, introductory epidemiology; BIO 200ab or 201ab, introductory biostatistics; BIH 219c, *Multiple Regression Analysis for HPM*; HPM 206ab, *Economic Analysis;* HPM 219a, *Financial Transactions and Analysis;* HPM 220b, *Financial Management and Control;* HPM 243c, *Health Economics: Economic Analysis of the Health Care System;* HPM 255c, *Reimbursement Systems;* a course in both environmental health and health and social behavior; and HPM 290abcd, *Applied Research and Practice in HPM*. Recommended elective courses include those on economics of the health sector, cost-benefit analysis of health programs, the role of government in the health care system, and business and labor in the health system.

Health Research and Analysis This concentration is designed for students looking toward doctoral education and research careers in areas such as health economics, quality of care, technology assessment, health decision analysis, cost-effectiveness analysis, cost-benefit analysis, and advanced statistical analysis.

Required courses for the concentration include EPI 200a, *Introduction to Epidemiology;* BIO 200ab or 201ab, introductory biostatistics; BIH 219c, *Multiple Regression Analysis for HPM*; HPM 206ab, *Economic Analysis;* HPB 280b, *Decision Analysis for Health and Medical Practices;* HPM 286s, *Decision Analysis in Clinical Research;* a course in both environmental health and health and social behavior; and HPM 290abcd, *Applied Research and Practice in HPM*. Recommended elective courses include those on survey research, epidemiologic research, economic analysis, financial analysis, and quality assessment. Second-year students are encouraged to enroll in relevant courses at Harvard Business School, John F. Kennedy School of Government, and Harvard Graduate School of Education.

International Health This concentration is designed for students with prior international experience and relevant foreign language skills who are interested in management or policy careers in developing countries or in organizations that work extensively abroad. This concentration is linked to broader international health programs in the school.

Required courses for the concentration include EPI 200a or 201a, introductory epidemiology; BIO 200ab or 201ab, introductory biostatistics; BIH 219c, *Multiple Regression Analysis for HPM*; HPM 205ab or 206ab, *Economic Analysis;* HPM 219a, *Financial Transactions and Analysis;* HPM 220b, *Financial Management and Control;* PIH 211b, *Health Program Management in Developing Countries*, or ID 262a, *Practice of International Health;* a course in both environmental health and health and social behavior; and HPM 290abcd, *Applied Research and Practice in HPM*. Recommended elective courses include those on infectious disease control, demography, and political economy. Second-year students are encouraged to enroll in relevant courses at the John F. Kennedy School of Government.

Master of Science in Health Policy and Management (two-semester program)

The two-semester SM program is designed for students pursuing research careers in public or private sector health care institutions, particularly for physicians (and other candidates with relevant advanced degrees) who desire an intensive exposure to analytic and quantitative skills. The degree is appropriate for students interested in either domestic or international research questions. Recent graduates have taken such positions as senior clinical research associate at a hospital, and fellow in the Division of Clinical Decision Making at New England Medical Center.

Applicants generally hold graduate medical or other professional degrees and have significant experience in health services. They typically expect to devote a substantial portion of their careers to research, particularly in areas such as health services research, cost-effectiveness analysis, and clinical decision-making.

Required courses for the degree include BIO 200ab or 201ab, introductory biostatistics, or BIO 206st, *Statistical Principles in Medical Research;* EPI 200a or 201a, introductory epidemiology, or EPI 208st, *Introduction to Clinical Epidemiology;* up to 10 tutorial credits; and an additional 10 credits in courses within the department. Recommended electives include upper-level courses in biostatistics, epidemiology, health economics, health services research, health decision sciences, quality improvement, technology assessment, and program evaluation.

Doctor of Science in Health Policy and Management

The department is considering the establishment of a small SD program in Health Policy and Management. Eligible applicants will include research-oriented physicians, lawyers, and scientists with advanced degrees. If the program is launched, the deadline for the first set of applications will be either January 2, 1996, or January 1, 1997, for matriculation in September of the respective year. More information about the SD program will be available after September 1, 1995.

Please see page 70 for information about the SD program in International Health Policy and Economics in the Department of Population and International Health.

Doctor of Philosophy in Health Policy

The PhD in Health Policy, awarded by the Faculty of Arts and Sciences, is designed for students seeking teaching careers in institutions of higher learning (schools of public health, public policy, and medicine) and/or research careers in health policy. It is a collaborative program of four Harvard University faculties: the Graduate School of Arts and Sciences, the School of Public Health, the Medical School, and the John F. Kennedy School of Government. Because this is an interfaculty program, enrolled students take courses throughout the university.

Students select one of the following concentrations within health policy: decision sciences, economics, organizational behavior, political analysis, or statistics and evaluative science. In addition, students specialize in one of the fol-

For more information about the PhD program, including financial aid, please contact Joan P. Curhan, Director, PhD Program in Health Policy, 79 John F. Kennedy Street, Cambridge, MA 02138.
Phone: 617-496-5412
Fax: 617-496-9053

Faculty

Department Chair: Robert J. Blendon, MBA (University of Chicago), MPH, DSc (Johns Hopkins University); Roger Irving Lee Professor of Health Policy and Management. Politics of health care; access to health care; approaches to health care reform; influence of public opinion in shaping health policy.

Diana Barrett, SM (Boston University), MBA, DBA (Harvard University); Lecturer on Management. Management of quality in clinical units; evolution of multi-institutional systems.

Peter Braun, MD (Columbia University); Lecturer on Public Health. Resource-based relative values of physicians' services; medical decision making; cost-effectiveness analysis.

Troyen A. Brennan, MA (Oxford University), JD, MPH, MD (Yale University); Professor of Law and Public Health; Professor of Medicine, Harvard Medical School. Medical ethics; personal injury and environmental litigation; medical malpractice and health policy reform.

Peter I. Buerhaus, MS (University of Michigan), PhD (Wayne State University); Assistant Professor of Health Services Research. Cost-effective use of the nation's supply of registered nurses.

Paul H. Campbell, MPA (Portland State University), SD (Harvard University); Lecturer on Management. Financial management, strategic planning, and reimbursement systems; health services in developing countries.

Alison Cullen, SM, SD (Harvard University); Assistant Professor of Health Policy and Management (Health Policy and Management and Environmental Health). Environmental exposure and risk assessment; probabilistic approaches to gauging uncertainty in environmental hazards; international cooperation on remediation of environmental degradation. (On leave 1995-96)

Faculty

Penny H. Feldman, AM, PhD (Harvard University); Lecturer on Political Science. State and local health policy; implementation of universal health care; home care.

Harvey V. Fineberg, MD, MPP, PhD (Harvard University); Professor of Health Policy and Management and Dean of the Faculty of Public Health. Technology assessment; cost effectiveness and decision analysis; AIDS policy, prevention, and education; vaccine evaluation and policy; health care reform.

John D. Graham, AM (Duke University), PhD (Carnegie-Mellon University); Professor of Policy and Decision Sciences, Director of the Center for Risk Analysis, and Director of the Harvard Injury Control Center. Environmental protection; prevention of intentional and accidental injury.

James K. Hammitt, SM, MPP, PhD (Harvard University); Associate Professor of Health Policy and Management. Mathematical modeling and analysis of economic behavior and decision making under uncertainty, with applications to valuation, regulation, and management of health and environmental quality.

David Hemenway, AM (University of Michigan), PhD (Harvard University); Senior Lecturer on Political Economy. Intentional and unintentional injury; health care economics.

William C. Hsiao, MPA, PhD (Harvard University); K. T. Li Professor of Economics; Member of the Faculty, Harvard Business School. Health care systems; control of health care costs; universal insurance coverage.

Nancy M. Kane, MBA, DBA (Harvard University); Lecturer on Management. Financial health and competitive strategies of health care organizations; provider behavior under third-party payment systems.

Jack Kasten, MPH (University of Michigan), JD (Boston College); Lecturer on Health Services Administration. Managed care; service utilization; manpower issues; hospital organization and management.

Eric A. Latimer, MS (Université de Montreal, Quebec), MS, PhD (Carnegie-Mellon University); Assistant Professor of Health Economics. Application of econometric methods to issues in health economics; physician payment; long-term care.

lowing areas of policy interest: environmental health, health care services, mental health, or public health.

Applicants must take the GRE, MCAT, or GMAT. In addition, applicants whose native language is not English must take the TOEFL.

Application for admission to the PhD in Health Policy is made through the Graduate School of Arts and Sciences (GSAS). Application materials must be obtained from GSAS at 8 Garden Street, Cambridge, MA 02138 (phone: 617-495-5315).

Courses Offered by the Department of Health Policy and Management, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

ID 240c. Principles of Injury Control (Hemenway, Graham)
Introduces the problem of intentional and unintentional injury, including motor vehicle crashes, fires, and violence. Examines control options, methods for evaluating prevention programs, and determination of the optimal combination of countermeasures. (2.5 credits)

ID 250a. Ethical Basis of the Practice of Public Health (Roberts, Reich)
Provides a broad overview of the main philosophical and moral ideas that are used to resolve debates of public health policy. Helps students develop the capacity to analyze, criticize, evaluate, and construct policy-oriented arguments. (2.5 credits)

ID 251s. Ethical Basis of the Practice of Public Health: Health Care Delivery (Brennan)
Emphasizes US health care policy and modern medical ethics to explore the political theory of medical care. Helps health professionals understand the manner in which political economy and ethics interact in health care policy decisions. (2.5 credits)

HPM 204d. Meta-Analysis of Clinical Trials and Their Impact on Medical Efficiency (Colditz, Laird)
Focuses on research synthesis (meta-analysis) and on the use of data to inform clinical decision making and health care policy. (2.5 credits)

HPM 205ab. Economic Analysis for Public Health (Hemenway)
Introduces basic principles of economics and economic analysis, particularly as they apply to public health. Covers such aspects of microeconomic theory as determinants of supply and demand, the theory of markets, economic efficiency, and other topics in health care economics. (5 credits)

HPM 206ab. Economic Analysis (Hemenway)
Brings students to an intermediate-level understanding of microeconomic theory. Emphasizes the uses and limitations of the economic approach. (5 credits)

HPM 207ab. Econometrics for Health Policy (Yip)
Provides students with an understanding of econometric concepts and methods used in health policy research. Special attention is given to modeling and model specification issues. (5 credits)

HPM 208cd. Health Care Regulation and Planning (Swartz)
Examines issues for US health care reform: insurance, financing, cost-control methods, incentives for hospitals and physicians, quality of care, long-term care, competitive versus regulatory approaches, and the roles of government and the private sector. (5 credits)

HPM 209b. Law for Public Health Professionals (Brennan, Parmet)
Explores the public health authority of state and US governments, related issues of civil liberties and equal rights, and legal aspects of attempts to control or prevent communicable diseases such as HIV. (2.5 credits)

HPM 210d. Medical Malpractice and Risk Management (Moulton)
Focuses on the development, implementation, and evaluation of risk management programs and legislative reforms in patient compensation plans. Emphasizes the relationships among quality of care standards, quality assurance, malpractice vulnerability, and risk management programs. (2.5 credits)

HPM 212ab. Health Program Evaluation (Needleman)
Examines issues in health program evaluation, with an emphasis on accuracy, relevance, and credibility of findings. Topics include establishing the scope of an evaluation, data sources and problems, inference, and presenting and applying findings. (5 credits)

HPM 216ab. Law, Economics, and Ethics of Health Care, Part I (Brennan)
Examines the legal issues that occur in the doctor-patient relationship. Issues include informed consent, conflicts of interest, reform of medical malpractice law, confidentiality, and right to die. (2.5 credits)

HPM 217cd. Law, Economics, and Ethics of Health Care, Part II (Brennan)
Provides an overview of the law of health care institutions, emphasizing recent developments. Topics include new payment methods and insurance forms, antitrust litigation, rationing mechanisms, and the role of health plan purchasing cooperatives in the future of medical care. (5 credits)

HPM 219a. Financial Transactions and Analysis (Kane)
Introduces concepts of financial accounting for the non-accountant user of financial information. Focuses on basic accounting transactions, statement preparation, accrual accounting, accounting for capital, fund accounting, and statement analysis. (2.5 credits)

HPM 220b. Financial Management and Control (Siegrist)
Introduces cost accounting and management control concepts and their uses in health service organizations. Topics include cost accounting, management control structure and process, responsibility accounting, budgeting, reporting, and variance analysis. (2.5 credits)

HPM 221ab. Management in Public Health in Industrialized Countries (Roberts)
Explores the management of health delivery organizations in industrialized countries. Topics include organizational issues, financial management, cost accounting, management control systems, and institutional strategy. (5 credits)

HPM 222d. Financial Management of Health Care Organizations (Kane, Puhy, Rivenson)
Continues the study of financial management begun in previous courses, focusing on a range of health care organizations, including hospitals, insurers/managed care plans, neighborhood health centers, physician groups, and home health agencies. (2.5 credits)

HPM 227cd. The Economics of Health Policy (Newhouse)
Considers policy issues related to Medicare reimbursement, malpractice, the aggregate number and distribution of physicians, and the demand for medical care services and insurance. (2.5 credits)

HPM 228cd. Law and Management of Health Care Competition (Moseley)
Examines management and legal issues surrounding the new organizational structures and relationships emerging in the health field as a result of increased competition, cost control mechanisms, and the latest health care reform proposals. (2.5 credits)

HPM 229cd. Health Law and Government: Key Interactions in the Evolution of the American Health Care System (Hyams, Green)
Examines the goals and implementation of governmental health care programs and the reasons for their success or failure. Discusses reimbursement, tax-exempt status of nonprofit hospitals, licensure and discipline of physicians, and collection and dissemination of personal medical information. (2.5 credits)

HPM 230cd. Managing People in Health Care Organizations (Moseley)
Explains the basic systems and strategies for managing human resources in health care delivery organizations, including principles of recruitment, management, and supervision. Stresses the role of labor unions, management of staff relations, and downsizing. (5 credits)

HPM 231c. Competitive Strategy Determination (Moriarty)
Focuses on the conceptual framework needed to plan for the long-term viability of health care organizations. Students learn to appreciate the concepts of competitive strategy and competitive advantage and gain the tools and skills to formulate and evaluate organizational strategy. (2.5 credits)

HPM 232c. Operations Management in Service Delivery Organizations (Pliskin)
Examines the role of operations in an organization. Topics include process and capacity analyses, types of processes, productivity, quality standards, and operating strategy. (2.5 credits)

HPM 233d. Strategic Marketing Management in Health Systems (Wasek)
Examines marketing within a strategic framework across the public and private sectors, domestic and international health systems, and social marketing contexts. Marketing management, research, and strategy techniques are discussed and applied to program design, business planning, and implementation issues. (2.5 credits)

HPM 234d. Managing in Health Organizations (Cannon)
Reviews the essential tasks, functions, and skills of general managers, including negotiation, personnel selection, developing consensus for organizational priorities, making good use of consultants and middle management, diagnosing problems, and allocating resources. (2.5 credits)

HPM 236cd. Managed Health Care (Cannon)
Focuses on recruiting and compensating primary care physicians; negotiating and contracting with specialty physicians and hospitals; managing hospital utilization; marketing and member service; rating, underwriting, and premium construction; and dealing with special markets, such as Medicaid. (5 credits)

HPM 238c. Strategic Use of Information Systems in Health Care Delivery (Nobel)
Explores information systems from the perspectives of providers, payers, and consumers. Topics include computerized patient records, repository data bases, clinical decision support systems, and interactive multimedia communications. (1.25 credits)

Faculty

Sol Levine, MA, PhD (New York University); Professor of Health Behavior (Health and Social Behavior and Health Policy and Management). Social determinants of health; social stress; quality of life; health professions and organizations; health policy.

Jack Needleman, MA (City College of New York), PhD (Harvard University); Assistant Professor of Economics and Health Policy. Health economics and health policy; econometrics, research design and evaluation, applied policy analysis; management of the policy process; hospital finance.

Joseph P. Newhouse, PhD (Harvard University); John D. MacArthur Professor of Health Policy and Management in the Faculties of Medicine, Government, Public Health, and Arts and Sciences; Director of the Harvard University Division of Health Policy Research and Education; and Chair of the Committee on Higher Degrees in Health Policy. Financing and organization of medical care; medical malpractice; manpower policy; outcome research.

R. Heather Palmer, MB, BCh (Cambridge University), SM (Harvard University); Lecturer on Health Services and Director of the Center for Quality of Care Research and Education. Quality of health care; incorporation of evaluation measures into health care reform plans.

A. David Paltiel, MPPM, MA, MPhil, PhD (Yale University); Assistant Professor of Health Policy and Management. Health policy modeling; economic and epidemiological consequences of AIDS clinical trial design and HIV clinical outcomes research.

Deborah B. Prothrow-Stith, MD (Harvard University); Professor of Public Health Practice and Assistant Dean for Government and Community Programs. Community-based violence prevention; violence prevention protocols for primary care settings.

Lorenz R. Rhomberg, PhD (State University of New York at Stony Brook); Assistant Professor of Risk Assessment (Health Policy and Management and Environmental Health). Critical analysis of the methods and procedures of human risk assessment, especially quantitative methods for putative carcinogens.

Faculty

Marc J. Roberts, PhD (Harvard University); Professor of Political Economy; Member of the Faculty, John F. Kennedy School of Government. Health policy; environmental policy; ethical aspects of allocating scarce public health resources.

Katherine Swartz, MS, PhD (University of Wisconsin); Associate Professor of Health Policy and Management. Analyzing populations without health insurance; developing policies to finance universal health insurance; structures of financial incentives for physicians.

Alvin R. Tarlov, MD (University of Chicago); Professor of Health Promotion. Health outcomes assessment in individuals and population groups.

Milton C. Weinstein, AM, MPP, PhD (Harvard University); Henry J. Kaiser Professor of Health Policy and Management (Health Policy and Management and Biostatistics); Professor of Medicine, Harvard Medical School. Cost-effectiveness of health practices and technologies.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School, unless otherwise indicated.

David R. Calkins, MD, MPP (Harvard University); Assistant Professor in the Department of Health Policy and Management. Quality assurance; health promotion and disease prevention; access to health care.

Deborah J. Cotton, MD (Boston University), MPH (Johns Hopkins University); Assistant Professor in the Department of Health Policy and Management. Clinical epidemiology of HIV infection; HIV/AIDS in women; health science policy related to HIV/AIDS clinical research.

John R. Delfs, MD (Harvard University); Assistant Professor in the Department of Health Policy and Management. Aging and long-term care policy; impact of structure and organization on health services delivery.

Robert A. Dorwart, SM (Harvard University), MD, MPH (Tulane University); Professor in the Department of Health Policy and Management. Organization and financing of care; practice patterns, quality of care, and administration.

HPM 239bcd. Applied Financial Analysis of Health Care Organizations (Kane)
Builds skills by assigning students a set of health care organization financial statements to convert to a standardized format, build into a data base, and use for the analysis of a specific research question and the writing and presentation of findings. (3.75 credits)

HPM 241ab. Health Care in the US: System, Policy, and Comparative Perspectives (Akula)
Examines the organization of the US health care system, the current policy debate about health care reform, and ways in which health care systems of other industrialized nations provide insight into the US experience. (5 credits)

HPC 242c. Strategies and Politics for Change in Health (Blendon)
Focuses on development of strategies to influence public policy in order to improve the health of populations. Topics include the legislative process, the courts, administrative bodies, the media, public opinion, advocacy groups, and policy research. (2.5 credits)

HPM 243c. Health Economics: Economic Analysis of the Health Care System (Hsiao)
Introduces health economics, the use of economic analysis to examine major health care financing and delivery issues, and the development of policies and programs designed to address them. Topics include financing, access, utilization, and cost control; market structure; and national health plans. (2.5 credits)

HPM 244d. Pharmaceutical and Biotechnology Industries: Public Policy and Regulatory Issues (Norris, Curran)
Analyzes public policy and legal issues in the pharmaceutical and biotechnology industries, stressing research and development of new biomedical products. Examines regulatory programs for new product development, the ethics of clinical investigation, and the ethics of conflict of interest. (1.25 credits)

HPM 245d. Leadership in Public Health (Prothrow-Stith, Blendon)
Provides students with concrete skills needed to fill leadership positions in health. Topics include public speaking, articulation of goals, negotiation, budget development, and constituency building. (2.5 credits)

HPM 246abcd. Seminar In Health Policy (Newhouse, Staiger, Cutler, Frank)
Covers the financing and organization of health care, medical manpower, medical malpractice, technology assessment, prevention, mental health, long-term care, and quality of care. (2.5 credits)

HPM 248cd. Issues, Special Interests, and Health Care Reform (Blendon, Newhouse)
Examines key issues in the health care system as they affect doctors, hospitals, insurers, governments, and the public. Analyzes the roles of labor and management, their interactions on benefit policies and collective agreements, and their impact on issues of public policy concern. (2.5 credits)

HPM 249cd. Development of Federal Health Policy (Calkins, Nuzzo)
Discusses the interplay of forces, both internal and external to government, which influence federal health policy decisions. Describes the actors and the policy development process. Develops skills in policy analysis, writing of memoranda, and government relations. (2.5 credits)

HPM 253s. Quality Improvement in Health Care (Berwick, James, Godfrey)
Explores the theoretical foundations of quality improvement, with an emphasis on applications in clinical settings. Teaches basic principles of statistical process control, improvement projects, systems thinking, and effective teamwork. (2.5 credits)

HPM 254cd. Use of Functional Status Measures in Outcomes Research (Tarlov, J.E. Ware)
Enables students to acquire hands-on experience with outcomes measurement by participating in a comprehensive study of major health status measuring instruments. (5 credits)

HPM 255c. Reimbursement Systems
Examines issues related to third-party reimbursement for health care institutions and individual providers. Issues include cost containment efforts, provider and policy perspectives, and managed care. (2.5 credits)

HPM 256c. Clinical Quality Measurement for Quality Improvement (Palmer, Lawthers, Banks)
Introduces the terminology, concepts, methods, and strategies for clinical quality measurement in a variety of health care environments. Takes a rigorous analytic approach using epidemiologic methods. (2.5 credits)

HPM 257c. Use of Outcomes in Quality Assessment (Greenfield)
Addresses the applications of outcomes research to quality of care assessment and effectiveness. Focuses on the historical, conceptual, and practical basis for using outcome vis-a-vis process. Develops the basis for the routine interpretation and use of health status measures. (1.25 credits)

HPM 258d. Physician Performance (Calkins, Pearson)
Examines factors influencing physician practice, including training, experience, organizational setting, financial incentives, and patient preferences. Considers strategies for changing physician behavior, such as education, feedback, guideline development, and utilization management. (2.5 credits)

HPM 259d. Quality Management in Health Care (Blumenthal, Bohmer)
Introduces the concepts and tools of total quality management. Topics include continuous quality improvement; quality planning, measurement, design, and improvement; and statistical process control. (1.25 credits)

HPM 266cd. Seminar on Refugee Trauma (Mollica, Lavelle, Appleton)
Focuses on the public health problems of highly traumatized refugee populations. Provides a comprehensive overview of the international approach, theoretical models, and public health strategies for dealing with the refugee crisis. (2.5 credits)

HPM 267d. Health and Medical Care in an Aging Population (Delfs, Avorn, Monane)
Introduces the public health and public policy implications of an aging population. Topics include the demography, epidemiology, and politics of aging; delivery and financing of health care for older populations; ethical issues in health policy; and quality of care measurement of innovative treatments and delivery systems. (2.5 credits)

HPP 268c. Financing Health Care in Developing Countries (Hsiao, Berman)
Provides an introduction to public and private financing of health care in developing countries. Analyzes economic considerations in alternative approaches to financing, reviews formal perspectives of economic theory, and assesses links between stages of national development and health care financing. (2.5 credits)

HPM 269b. Comparative Health Systems in Industrialized Societies (Field)
Undertakes a comparative examination of the health systems of industrial and urban societies in order to provide an understanding of shared features and critical differences. (2.5 credits) Offered 1995-96 and alternate years.

HPM 270a. Issues in Mental Health (Dorwart, Chartock)
Examines the historical development and current status of policy issues relevant to mental health services in the US. Topics include deinstitutionalization of mental hospitals, privatization of psychiatric services, the role of federally funded community mental health centers, and the organization and financing of state mental health agencies. (2.5 credits)

HPM 271e. Overview of Domestic Violence (Prothrow-Stith, Isaac)
Covers the epidemiology of domestic violence, dynamics of abusive relationships, responses of the criminal justice and health care sectors, the role of the shelter and advocacy communities, relationships with other forms of violence, and strategies for primary prevention. (1.25 credits)

HPM 272st. Health Services/Policy Research (Epstein, Komaroff)
Introduces major issues in health policy, including access, provision of insurance, and physician and hospital payment. Examines methodologies used to study these areas, including assessment of severity of illness and health status, measurement of quality, and survey techniques. (5 credits)

HPM 274abcd. Oral Health Policy Research Seminar (Douglass)
Concentrates in the fall term on the research methods of current national studies of the need, supply, demand, and cost of dental care. The spring term emphasizes research work on relevant dental care policy subjects. (5 credits)

HPM 275ab. Dental Public Health and the Dental Care Delivery System (Douglass)
Reviews basic concepts in dental public health and dental care delivery systems in the US and elsewhere. Examines issues of utilization of services, need versus demand for dental care, methods of quality assurance, and the role of government agencies in the provision and regulation of care. (2.5 credits)

HPB 280b. Decision Analysis for Health and Medical Practices (Paltiel)
Discusses the methods and applications of decision analysis, cost-effectiveness analysis, and benefit-cost analysis in health care technology assessment, medical decision making, and health resource allocation. (2.5 credits)

HPB 281c. Clinical Decision Analysis (Weinstein, Kuntz)
Covers methods and applications of decision analysis and other modeling techniques to clinical problems. Topics include Markov models, life expectancy modeling, dynamic models, ROC analysis and diagnostic technology assessment, quality of life valuation, multiattribute utility, and behavioral decision theory. (2.5 credits)

HPB 282d. Cost-Effectiveness and Cost-Benefit Analysis for Health Program Evaluation (Graham, Weinstein)
Covers methods and applications of cost-effectiveness and cost-benefit analysis for health program evaluation, medical technology assessment, and environmental risk analysis; economic value of life saving; health status indices; ethical issues. (2.5 credits)

HPE 284a. Decision Theory (Paltiel, Hammitt)
Introduces the axiomatic methods of economic reasoning, standard models of individual decision making under uncertainty, and methodological issues created by applications to health research. (2.5 credits)

HPE 285b. Seminar on Risk Analysis (Graham)
Challenges students to evaluate the risk analysis framework as an approach to managing health, safety, and environmental hazards. Addresses contemporary issues in risk assessment, evaluation, management, and communications. (2.5 credits)

HPM 286s. Decision Analysis in Clinical Research (Weinstein)
Introduces decision analysis methods relevant to clinical decision making and clinical research; probability theory; utility theory; diagnostic test use and evaluation; and uses of decision analysis in clinical decision making and research design. (2.5 credits)

Faculty

Arnold M. Epstein, AM (Harvard University), BMS (Dartmouth Medical School), MD (Duke University); Associate Professor in the Department of Health Policy and Management. Effects of organizational factors, financial incentives, and socioeconomic characteristics on process and outcomes of care.

John Hedley-Whyte, MB, BChir, MA, MD (Cambridge University); Professor in the Department of Health Policy and Management. Standards for medical equipment and services.

Regina E. Herzlinger, DBA (Harvard University); Professor in the Department of Health Policy and Management. Primary affiliation: Harvard Business School. Management of health care organizations and systems.

Matthew H. Liang, MD, MPH (Harvard University); Professor in the Department of Health Policy and Management. Epidemiology of rheumatic disease and disability; clinimetrics; health services research; technology assessment.

Richard F. Mollica, MD (University of New Mexico), MAR (Yale University); Associate Professor in the Department of Health Policy and Management. Survey instruments for traumatized populations; cross-cultural psychiatry and psychiatric epidemiology; international health policy.

Albert G. Mulley, Jr., MD, MPP (Harvard University); Associate Professor in the Department of Health Policy and Management. Uses of decision analysis to understand variation in practices for health problems.

Adjunct Faculty

Karen S. Backer, MS; Director of Finance, New England Center Hospitals, Inc.

Donald M. Berwick, MPP, MD; President and CEO, Institute for Healthcare Improvement.

Samuel P. Caper, MS, MD; Chairman, CEO, and President, The Codman Research Group, Inc.

Mark G. Field, AM, PhD; Professor of Sociology, Emeritus, Boston University.

John P. Glaser, PhD; Vice President, Information Systems, Brigham and Women's Hospital.

Sheldon Greenfield, MD; Professor of Medicine, Tufts University.

Adjunct Faculty

Maria G. M. Hunink, MD, PhD; Associate Professor, University of Groningen, The Netherlands.

Magnus G. Johannesson, PhD; Assistant Professor, Stockholm School of Economics.

Sherrie H. Kaplan, MPH, MSPH, MS, PhD; Adjunct Assistant Professor, University of California, Los Angeles.

Lucian L. Leape, MD; Adjunct Professor of Health Policy in the Faculty of Public Health.

George D. Lundberg II, MD, MS, ScD; Editor, *Journal of the American Medical Association.*

Daniel D. Moriarty, MBA; Vice President, Information Systems Group, John Snow, Inc.

George B. Moseley III, MBA, JD; Instructor, University Seminar Center.

Benjamin W. Moulton, MPH, JD; Executive Director, American Society of Law, Medicine and Ethics.

Jeremy J. Nobel, MD, MPH, SM; Director, Workwell Occupational Health Services, Salem Hospital.

John A. Norris, JD, MBA; President and CEO of John A. Norris, Esquire, PC, a law and public affairs/relations consulting firm.

Wendy E. Parmet, JD; Professor of Law, Northeastern University.

Joseph S. Pliskin, SM, PhD; Sidney Liswood Professor of Health Care Management, Ben-Gurion University.

Richard B. Siegrist, Jr., MS, MBA; Vice President and Chief Financial Officer of Transition Systems, Inc.

Glenn K. Wasek, SM; Vice President and Director, Marketing Group, John Snow, Inc.

HPM 287abcd. Research Seminar on Risk and Decision Analysis (Paltiel, Graham)
Introduces students to state-of-the-art scholarship in risk analysis and decision theory. Topics include theory and techniques of risk analysis; choice under uncertainty; health policy models; cost-effectiveness analysis; and statistical decision theory. (5 credits)

HPM 288c. Management Science (Pliskin)
Introduces quantitative tools and methods to promote optimal use and allocation of scarce resources. Topics include linear programming, transportation, assignment, network flows, dynamic programming, queuing, and simulation. (2.5 credits)

HPM 289cd. Practicum in Decision Analysis and Cost-Effectiveness (Hammitt, Kuntz)
Enables students to design and undertake a research project in decision analysis or cost-effectiveness analysis on a topic of their choice. (2.5 credits)

HPM 290abcd. Applied Research and Practice in Health Policy and Management (Hemenway)
Teaches students to apply analytic and managerial methods to concrete problems. Each student carries out a research project, conducts a policy analysis, or performs a management study on behalf of an individual or institutional sponsor. (10 credits)

HPM 291cd. Applied Research in the Law of Health Policy and Management (Brennan)
Allows students in the Law and Public Health concentration of the MPH degree program to apply analytic skills to a practical problem. Students carry out a research project, perform a policy analysis, or conduct a managerial study on behalf of an individual or institutional sponsor. (5 credits)

HPM 292d. Research Ethics (Brennan)
Reviews ethical issues that arise in the conduct of research. Topics include informed consent, disclosure of conflicts of interest, multiple authorship, issues in mentoring (including gender and race-based discrimination), and federal oversight. Required for all students engaged in studies supported by the National Institutes of Health. (1.25 credits)

HPM 293d. Surveys for Health Policy (Blendon, Donelan)
Gives students experience in designing, conducting, analyzing, and reporting results of surveys relevant to health policy issues. Topics include defining issues, contracting with survey organizations, collecting objective and subjective data, sampling specialized populations, and presenting data. (2.5 credits)

HPM 294b. Methodology Issues in Health Services Research (Kaplan)
Emphasizes the array of methods available to health services researchers, their disciplinary origins, underlying assumptions, and strengths and weaknesses. (2.5 credits)

HPM 296cd. Doctoral Seminar in Health Economics (Hsiao)
Explores frontier work in the field of health economics. Focuses on advanced theories and economic models useful for policy analysis, and on helping students develop research topics. (2.5 credits)

Tutorial Programs, Field Experience
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research, undertake specialized readings, perform field projects, or carry out independent studies.

DEPARTMENT OF MATERNAL AND CHILD HEALTH

The goal of the Department of Maternal and Child Health is to improve the health of women and children through basic and applied research, through the preparation of professionals for leadership positions, and through advocacy and community service.

Mary Jean Brown
SM/Maternal and Child Health

A seasoned public health worker, Mary Jean is the assistant director of a childhood lead poisoning prevention program at the Massachusetts Department of Public Health. Thirteen years with the program has taught her many things, but she realized that lead poisoning research could be strengthened, and that she wanted the skills to do it. "I'm a nurse by training but I really wasn't interested in going back into clinical work. I wanted an academic program that could fill in the holes in my self-education in public health," says Mary Jean.

"I was intrigued by the idea of a degree in public health with a concentration in maternal and child health," she says. "I'm here to get the kinds of tools that I need in program evaluation and research. Pediatric environmental health research in general, lead poisoning in particular, is not as strong as it could be." Her goal is to help eliminate lead poisoning. "Childhood lead poisoning is a finite disease. In ten years I hope that I will be looking for another job—in public health, of course!"

Faculty in the Department of Maternal and Child Health undertake research in six major areas: *infant mortality and morbidity,* including the evaluation of risk factors for mortality, methods for confidential perinatal inquiry, outcomes of high-risk infants, and the efficacy of early intervention; *normative growth and development,* including the analysis of patterns of growth, maturation, and behavioral, social, and nutritional changes in an aging cohort; *children with special needs,* including the assessment of health care for children with chronic illness or disability and the development of criteria for assessing proposals to reform the financing of health care; *high-risk youth,* including analysis of policies and strategies for preventing high-risk adolescent behaviors, examination of services for children and youth with HIV, and longitudinal studies of the risk factors for delinquency, violent behavior, substance abuse, and mental illness; *nutrition,* including epidemiologic studies of child undernutrition in the United States and developing countries, exploration of computerized screening for pregnant women at nutritional risk, and inquiries concerning HIV and breast-feeding; and *maternal and child health services,* including studies of the planning, policy development, and performance of federal, state, and local public health agencies.

The department's academic curriculum includes courses on maternal and child health problems of public health significance; the physical, social, and cognitive stages of human development; maternal and child health services; the roles of governmental, private, and voluntary health agencies; research methods; and the methodology of program planning, policy formation, and program evaluation in maternal and child health. All concentrators in the department are expected to acquire an understanding of normative growth and development, definition and research in maternal and child health problems, maternal and child health services, legislation supporting health and social services for mothers and children, and the planning of such ser-

Professor Felton Earls directs the Project on Human Development in Chicago Neighborhoods, a longitudinal study aimed at advancing our understanding about the roots of violent behavior.

For more information, please contact Marie C. McCormick, MD, ScD, Department of Maternal and Child Health, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1080
Fax: 617-432-3755

For more information about the four-semester, two-degree program in Maternal and Child Health and Parent-Child Nursing, please contact Jane Gardner, SD, Department of Maternal and Child Health,
677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1080
Fax: 617-432-3755
For more information about the Simmons College component of the program, please call 617-521-2141.

Faculty

Department Chair: Marie C. McCormick, MD, ScD (Johns Hopkins University); Professor of Maternal and Child Health; Professor of Pediatrics, Harvard Medical School. Infant mortality; outcomes of high-risk neonates and interventions to ameliorate adverse outcomes.

Stephen L. Buka, SM, SM, SD (Harvard University); Assistant Professor of Maternal and Child Health. Causes and prevention of behavioral and developmental disorders of children and adolescents; substance use and psychiatric epidemiology.

Felton J. Earls, MD (Howard University); Professor of Human Behavior and Development; Professor of Child Psychiatry, Harvard Medical School. Longitudinal research to understand how community, family, and individual factors influence delinquent and criminal behavior.

Jane Gardner, SM (Boston College), SM, SD (Harvard University); Lecturer on Maternal and Child Health. Quality of health care for women and children; health outcomes research in publicly funded programs.

vices. All students fulfill the school-wide requirements for basic courses in biostatistics and epidemiology. Limited tuition support may be available for some students in the department.

As described below, the department offers both a four-semester and a two-semester Master of Science (SM) program, a dual master's degree program for nurses, and a doctoral program leading to the Doctor of Science (SD) or Doctor of Public Health (DPH) degree. Please refer to page 7 for information about the Master of Public Health concentration in Public Management and Community Health.

Master of Science in Maternal and Child Health (four-semester program)

The four-semester SM program is designed to prepare students for mid-level positions as project analysts, service coordinators, and managers in the field of maternal and child health. Recent graduates have taken such positions as project analyst for the perinatal health center at Brigham and Women's Hospital and director of planning and development for the New York Regional Transplant Program.

Applicants to this program should have either a master's degree in a field not directly related to health (such as law, education, sociology, or statistics) or a bachelor's degree in a health-related field and at least two years of relevant work experience.

Of the 80 credits necessary to earn the four-semester SM, at least 30 must be earned in departmental courses or approved courses in other departments. Students in this program must also fulfill core requirements in biostatistics, epidemiology, environmental determinants of health, social and behavioral sciences, and health policy, planning, and administration. A minimum of 5 credits must be earned in field work either during the summer between the two years or in the second academic year.

Master of Science in Maternal and Child Health (two-semester program)

The two-semester SM program is designed to prepare health professionals for leadership positions or research careers in public and private agencies. Recent graduates have taken such positions as director of adolescent medicine at New England Medical Center, assistant director of public health at Georgetown University, and assistant medical director of the Rhode Island Health Department.

Applicants eligible for the two-semester SM program are established practitioners or investigators holding prior master's or doctoral degrees in a related field such as medicine, dentistry, nursing, social work, nutrition, physical therapy, psychology, health education, or anthropology.

Of the 40 credits necessary to earn this degree, 20 must be earned in the Department of Maternal and Child Health or in approved courses from other departments. Students in this program must also fulfill core requirements in biostatistics, epidemiology, environmental determinants of health, social and behavioral sciences, and health policy, planning, and administration.

Four-Semester, Two-Degree Master of Science in Maternal and Child Health (HSPH) and Parent-Child Nursing (Simmons College)

This four-semester, two-degree program is designed to prepare pediatric, school health, and obstetric/gynecologic nurse practitioners for leadership roles in public and private agencies. Recent graduates have taken such positions as director of clinical services for the Family Planning Association of Maine, medical director of the Mattapan (MA) Community Health Center, and staff director for the World Health Organization's Maternal Health and Safe Motherhood Program.

Applicants should hold a bachelor's degree from a program accredited by the National League for Nursing, a license to practice nursing, and the equivalent of at least three years of full-time nursing experience. International nurses with equivalent backgrounds are eligible to apply. Applicants must meet the general admission requirements of both HSPH and Simmons College.

Students enroll in half-time study at both Simmons College and HSPH for two academic years, in addition to studying at Simmons for one summer session. The curriculum of the HSPH portion of the program is the same as that for the two-semester SM program.

Doctor of Science in Maternal and Child Health/Doctor of Public Health

The doctoral programs are designed to prepare public health professionals for research careers in academic institutions, public and private health agencies, and leadership roles in national and international organizations. Recent graduates have taken such positions as scientist/study director at the National Academy of Sciences and assistant professor in the HSPH Department of Population and International Health.

Applicants must have an advanced degree in a health field related to maternal and child health. They are expected to have a sound academic record with documented proficiency in the quantitative sciences, relevant work experience, and research interest in an area consonant with the goals of the department.

Doctoral candidates must spend at least two years in residence completing course work leading to a major (20 credits) in maternal and child health and minors (10 credits each) in two other fields. Students must pass the departmental written examination and the school-wide oral qualifying examination and must complete, defend, and submit a thesis based on independent research.

Courses Offered by the Department of Maternal and Child Health, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

MCN 200a. Physical Growth and Development I (Peterson)
Introduces the principles and assessment of physical growth, development, and maturation that are the basis for the health monitoring of populations of children from conception through adolescence, with an emphasis on public health implications. (2.5 credits)

MCH 202c. Physical Growth and Development II: Seminar on Factors Affecting Growth and Development (Dwyer, Farrell)
Explores the basic factors that influence physical growth and development from conception to maturity, and their implications at the individual, family, community and national levels. (1.25 credits)

MCH 203c. Secondary Data Sources (Warner)
Introduces databases commonly used by MCH researchers, including vital statistics data and census data. Topics include data acquisition procedures, database policy differences, and legal and security issues. (1.25 credits)

MCH 204ab. Maternal and Child Health Programs and Policies (Gardner)
Discusses health care programs for mothers and children in the context of growth and maturational processes, historical and legislative background, and social, mental health, and educational policies. Emphasizes action required to improve the health status of populations. (5 credits)

MCH 205b. Society and the Determinants of Child Health (Wise)
Provides an overview of the epidemiology, clinical pathways, and social determinants of major child health problems in the US. Examines perinatal outcomes, genetic and developmental disorders, chronic illness, and injuries and violence. (2.5 credits)

MCH 206d. Maternal and Child Health in Developing Countries (Valadian, Farrell)
Evaluates the core elements of MCH status and services in developing countries and analyzes factors shaping MCH programs in rapidly changing social environments, particularly those related to women's and children's health and nutrition. (2.5 credits)

MCN 207ab. Nutrition in Child Growth and Development (Dwyer)
Examines principles and practical problems encountered in developing policies and programs involving nutritional issues, growth, and development. Discusses general principles or elements of nutrition as scientific background for policy, and covers case studies of recent policy issues. (2.5 credits)

Faculty

Karen E. Peterson, RD (Peter B. Brigham Hospital), SD (Harvard University); Assistant Professor of Nutrition (Maternal and Child Health and Nutrition). Epidemiology of malnutrition in industrialized and developing countries; methodological issues affecting interpretation of growth and nutritional status indicators; design and evaluation of community-based nutrition interventions.

Joanna E. Siegel, SM, SD (Harvard University); Assistant Professor of Maternal and Child Health. Maternal and child health policy; analysis of risks to children's health; cost-effectiveness applications and methods.

Geoffrey L. Warner, MBA (New York Institute of Technology), PhD (Graduate School of the City University of New York); Assistant Professor of Maternal and Child Health. Econometric methods to measure health outcomes, access to care, and effects of health-related policies on women and children, with special relevance for minority groups.

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School.

Allen C. Crocker, MD (Harvard University); Associate Professor in the Department of Maternal and Child Health. Chronic illness and developmental disabilities in children; mechanisms of disability; prevention of developmental disorders.

Robert H. DuRant, MA, PhD (Emory University); Associate Professor in the Department of Maternal and Child Health. Problem behaviors of adolescents, including violence, sexual and contraceptive behaviors, substance use, and HIV risk behaviors.

Charles J. Homer, MD (University of Pennsylvania), MPH (University of North Carolina); Assistant Professor in the Department of Maternal and Child Health. Application of epidemiologic methods to the assessment of the effectiveness of health care services.

Ellice S. Lieberman, MD (University of Florida), MPH, DPH (Harvard University); Assistant Professor in the Department of Maternal and Child Health. Perinatal epidemiology; risk factors for adverse pregnancy outcomes; assessment of new technologies and care practices in obstetrics.

Faculty

Eli H. Newberger, MD (Yale University), SM (Harvard University); Lecturer in the Department of Maternal and Child Health. Child abuse and family violence.

Judith S. Palfrey, MD (Columbia University); Associate Professor in the Department of Maternal and Child Health. Development of preschool children; interface of health and educational services for children.

Douglas K. Richardson, MD (Johns Hopkins University), MBA (University of Pennsylvania); Assistant Professor in the Department of Maternal and Child Health. Impact of variations in practice styles on outcomes, resource use, and costs of neonatal intensive care.

Benjamin P. Sachs, MD, BS, MRCS, LRCP (St. Mary's Medical School, London University), DPH (University of Toronto); Associate Professor in the Department of Maternal and Child Health. Epidemiology and health policy issues relating to women and children in technological evaluation, infant mortality, and medical services.

Edward C. Tronick, MS (Cornell University), PhD (University of Wisconsin); Associate Professor in the Department of Maternal and Child Health. Neurodevelopment of infants and children exposed to drugs in utero; depressive symptoms and mother-infant interaction.

Paul Wise, MD (Cornell University), MPH (Harvard University); Assistant Professor in the Department of Maternal and Child Health. Issues of child health policy, particularly social disparities in infant mortality and the relationship between women and child health policies.

Adjunct Faculty

Johanna T. Dwyer, SM, SM, SD; Professor of Medicine and Community Health and Director, Stern Nutrition Center, Tufts Medical Center.

Marie P. Farrell, MS, MSN, EdD, MPH; Acting European MCH Advisor, World Health Organization.

William E. Kiernan, MEd, MBA, PhD; Research Associate, Children's Hospital.

Albert J. Reiss, Jr., MA, PhD; William Graham Sumner Professor of Sociology, Emeritus, Yale University.

Deborah K. Walker, EdM, EdD; Assistant Commissioner, Bureau of Family and Community Health, Massachusetts Department of Public Health.

MCH 208b. Adolescent Health (DuRant)

Examines adolescent health, health behavior, and intervention programs in relation to physical, psychosocial, and cognitive development. Topics include access to health care, guidelines for preventive services, health risk and problem behaviors, and use of violence and violence prevention programs. (2.5 credits)

MCH 209c. Services for Children with Disabilities (Crocker, Helm)

Looks at how service programs in the disability field are put together, supported, and evaluated. Uses outside guests from community programs for many sessions. (2.5 credits)

MCS 210ab. Personality and Cognitive Development: Application to Maternal and Child Health (Buka, Earls)

Examines the principles of child growth and development in the cognitive and psychosocial domains. Emphasizes the theories and research of Piaget, Freud, and Erikson, and their implications for the planning and implementation of health and related services for children and youth. (2.5 credits)

MCH 211c. Women, Health, and Development (Gardner, Swenson)

Addresses the major issues concerning women and their relationship to health worldwide, including the changing role of women in society. Discusses health problems in terms of their epidemiology and the impact of technology on their detection and treatment. Views issues from biological, medical, behavioral, cultural, and legal perspectives. (2.5 credits)

MCH 213d. Obstetric Epidemiology (Sachs, Richardson, Lieberman)

Tackles controversial issues in maternal health through techniques in epidemiology applied to obstetrics. Focuses on maternal mortality, obstetric and gynecologic morbidity, evaluation of obstetric health care, populations at risk, and the epidemiology of prenatal care and prematurity. (1.25 credits)

MCM 215cd. Planning and Evaluating Public Health Programs (Gardner)

Presents concepts and approaches to developing programs and services for any health, human service, or social program. Focuses on needs assessment, planning, design, budgeting, and evaluation of public health programs. (2.5 credits)

MCN 217c. Nutritional Surveillance (Peterson)

Covers theoretical and practical issues guiding the design and implementation of nutritional surveillance systems, including purposes for data, indicators of nutritional status for high-risk groups, methodological issues affecting the choice of indicators, and interpretation of data. (2.5 credits)

MPS 218d. The Urban Child in Global Perspective (Earls, Carlson)

Examines global and national patterns of urbanization and risk factors for physical and psychological morbidity, including changing family structure, homelessness, poverty and labor force participation, and exposure to infectious diseases. (2.5 credits)

MCH 219d. Research Methods in Maternal and Child Health (McCormick)

Provides an overview of research methods appropriate to maternal and child health. Topics include use of vital statistics, confidential perinatal inquiry, admission severity scores, child health status measures, and methods of ascertaining rare populations. (2.5 credits)

MCH 222ab. Social Services for Children, Adolescents, and Families (Newberger, Gary)

Presents the crucial role of social services in maintaining and promoting the health of children and their families. Examines both current political trends structuring the content and delivery of social services and social and psychological determinants of the need for those services. (2.5 credits)

MCE 223b. Child and Adolescent Mental Disorders: Public Health Perspectives (Buka)

Examines the occurrence and risk factors of mental disorders of childhood and adolescence, including drug abuse, depression, conduct disorder, suicide, and eating disorders. Emphasizes case definition, disorder classification, diagnostic and screening instruments, and data sources. (1.25 credits)

MCP 226cd. Urban Violence and the American Perspective (Earls, Prothrow-Stith, Moore, Stone)

Takes an interdisciplinary approach to the causes and possible remedies for the epidemic of urban violence in the US. The instructors are from Harvard Law School, John F. Kennedy School of Government, and HSPH. (5 credits)

MCH 229st. Introduction to Clinical Research (Homer, DuRant)

Familiarizes students with the concepts of quantitative and qualitative research. Topics include bias and chance, outcome and measurement issues, and analysis of research data. (1.25 credits) Not offered 1995-96.

MCH 232d. Physical Growth and Development III: Advanced Seminar (Valadian)

Covers in more depth the stages of physical growth and development introduced in MCN 200a. Expands on maturation, its components, their assessment, and underlying neurological, biological, and chemical changes. (2.5 credits)

Tutorial Programs, Field Experience

Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research, undertake specialized readings, perform field projects, or carry out independent studies. A formal tutorial is offered in the area of infant assessment in the context of prenatal exposures (Tronick).

DEPARTMENT OF MOLECULAR AND CELLULAR TOXICOLOGY

The goals of the Department of Molecular and Cellular Toxicology are to promote and conduct research and training on the effects of environmental chemicals on the health of human beings. In advancing an interdisciplinary approach to studies and research, the department aims to enhance the application of major recent advances in the biological sciences to toxicology and to enable students to work toward the solution of complex problems in environmental health.

Bevin Engelward
SD/Molecular and Cellular Toxicology

Bevin was an employee at HSPH and worked in business for a year before deciding to return to school to pursue science "that would have an impact on how people think about the health and the future of our planet."

Presently a fifth-year doctoral student in Professor Leona Samson's lab, Bevin has cloned and begun characterization of a mouse DNA repair enzyme and is developing a more detailed understanding of genetic regulation and biochemical mechanisms. "I just love biochemistry and genetics," says Bevin. "I also feel that the school supports the work of women scientists, in particular. They are role models for me—people I can consult with about life issues as a woman in science."

Anticipating continuing work in academia as a researcher and a professor, Bevin has observed that HSPH students and faculty "are genuinely concerned about the health of the planet and the health of the people. That makes for a great group of people. You're selecting for caring individuals, essentially."

The research and training program in the Department of Molecular and Cellular Toxicology explores the interactions of environmental chemicals with a variety of cellular and subcellular systems, the biochemical and molecular mechanisms of toxicity, and the health implications of environmental exposure. Modern toxicology is broad in scope and multidisciplinary in approach, using knowledge and techniques from the biological, chemical, physical, and medical sciences. It is often necessary to consider and analyze the relation between chemical, biological, and social factors affecting both the nature of and response to occupational or environmental exposure. For this reason, the department stresses interdisciplinary approaches that join the power of modern molecular genetics and cell biology with the problem orientation of public health.

Research and training cover such topics as receptor-mediated toxicity, tumor promotion, biochemical and genetic responses to oxidative stress, molecular and genetic toxicology, second messenger signaling systems, molecular biology of DNA repair and mutagenesis in prokaryotes and eukaryotes, development and use of animal and human cell culture models, regulation of early mitotic events in mammalian cells, genetic recombination and predictive carcinogenesis, and molecular mechanisms of genetic instability in cancer and aging. Students learn to identify toxic agents and seek ways to prevent or reverse their detrimental effects when possible.

As described below, the department offers a Doctor of Philosophy (PhD) program through the Biological Sciences in Public Health Program (a component of the Division of Medical Sciences, Graduate School of Arts and Sciences).

For more information about the department, please contact Liza Remar, Department of Molecular and Cellular Toxicology, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1178
Fax: 617-432-1780
E-mail: lremar@sph.harvard.edu

For application materials and information about admission to the PhD program, please contact the Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Room 435, Boston, MA 02115.
Phone: 617-432-0162

Applicants who have specific questions about the PhD program may contact Ruth Kenworthy, Division of Biological Sciences, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4470
Fax: 617-432-4098
E-mail: kenworthy@cvlab.harvard.edu

Doctor of Philosophy in Biological Sciences in Public Health (BPH) (Molecular and Cellular Toxicology)

Students wishing to study cellular and molecular biology as they pertain to major problems in public health should apply to the Biological Sciences in Public Health program. This program offers the PhD degree through Harvard University's Graduate School of Arts and Sciences, Division of Medical Sciences, Committee on Biological Sciences in Public Health.

The PhD program within this department is designed to offer advanced training in modern molecular and cellular toxicology. The program offers a firm foundation in the basic biomedical sciences, as well as in epidemiology and biostatistics. Specific courses supplement this core, as dictated by individual research concentrations. Students in this program engage in laboratory rotations in three different research areas, to enable them to assess realistically their interests in a thesis project and to evaluate the suitability of the laboratory and the mentor. At the completion of these rotations, students select an area of concentration and a thesis research laboratory and complete the required curriculum. A qualifying examination must be passed before engaging in thesis work, and the thesis must be defended before the granting of the PhD. Some students also participate in the Harvard-Markey Biomedical Scientist Training Program, a new pathway of graduate education designed to offer PhD students a greater knowledge of human biology and disease.

Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Those deficient in one of these areas may be admitted provisionally on the condition that appropriate courses will be taken before and/or after entering the program. Applicants must take both the GRE general and subject tests by October in order to meet the application deadline of December 15.

All students admitted to the program receive a stipend and tuition support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends. While funds to support international students are limited, one special scholarship is available each year for a student from a developing, sub-Saharan African country. There is also a university-wide fellowship program that provides funding to qualified underrepresented minority students in the sciences.

Graduates ordinarily assume positions as faculty members and research scientists in graduate schools, medical schools, research institutes, or schools of public health. Career opportunities in the biological sciences as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Courses Offered by the Department of Molecular and Cellular Toxicology, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

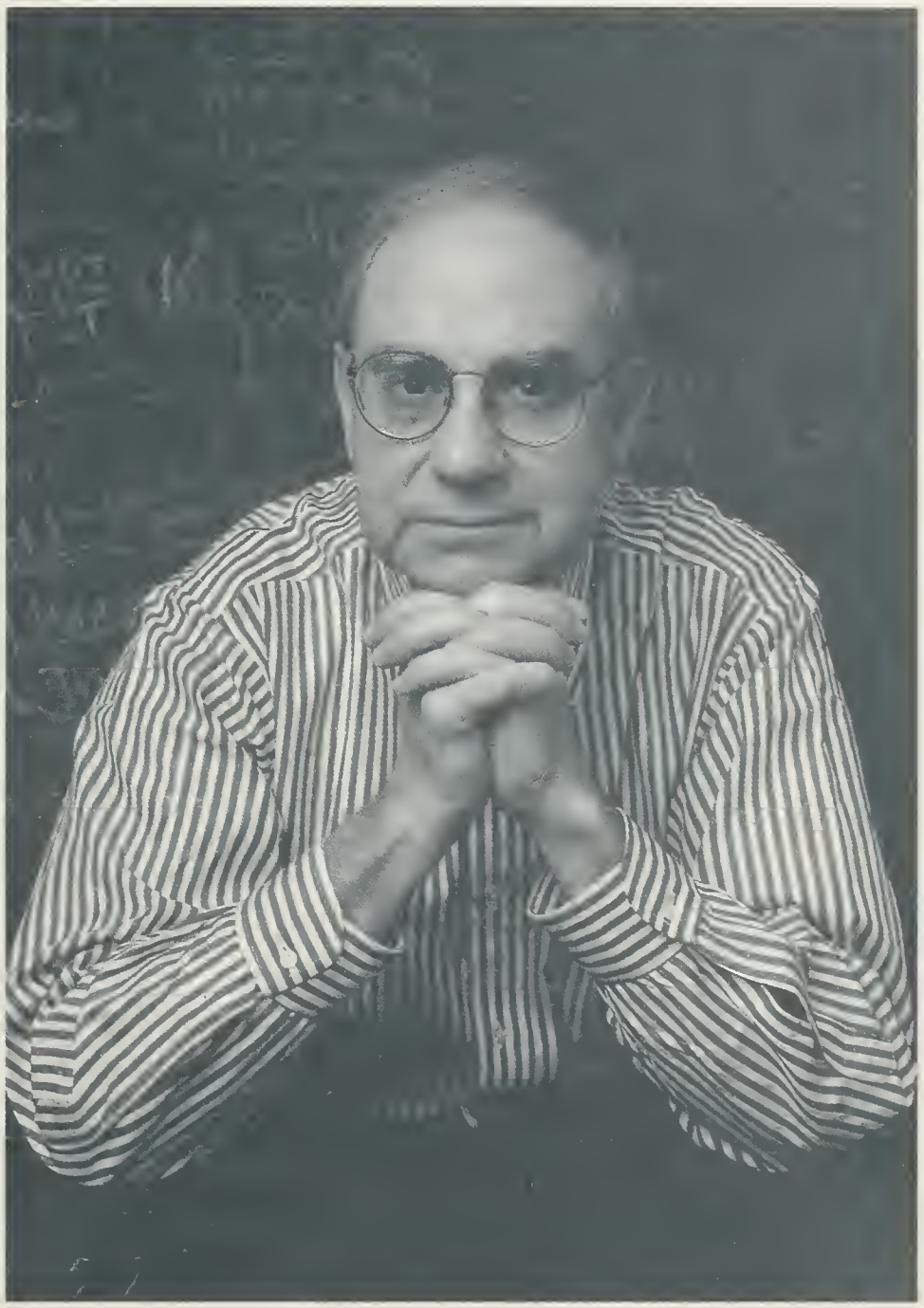
Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

TOE 204ab. Principles of Toxicology (Schlegel, Milton)
Emphasizes mechanisms of injury and clinical consequences following exposures to environmental and occupational chemicals. Examines actions at the molecular, cellular, organ system, and organismal levels, and discusses methods for detecting, evaluating, analyzing, and combating toxic effects. (5 credits)

TOX 208ab, 209cd. Seminar in Toxicology (Schlegel)
Includes seminars, journal clubs, and discussions of topics in basic research and the current literature in toxicology. (1 credit each semester)

TOX 210ab, 211cd. Advanced Toxicology (Tashjian)
Examines experimental methods of research in toxicology. Includes individual laboratory work. (5 credits each semester)

TOX 212cd. Molecular and Cellular Endocrinology (Tashjian)
Examines current knowledge and experimental approaches to understanding the biosynthesis and secretion of peptide and steroid hormones, and the biochemical and molecular mechanisms by which hormones act on target cells to regulate differentiated functions. Topics include structure and regulation of protein hormone genes, hormone receptor



Professor Armen Tashjian chairs the Department of Molecular and Cellular Toxicology.

structure and transduction mechanisms, and control of cellular calcium. (5 credits) Offered 1995-96 and alternate years.

TOX 225cd. Genetic Toxicology (Samson)
Explores the biological consequences of the interaction of toxic agents with the genome. Topics include DNA structure, chemical reactivity, repair, damage-inducible processes, mutagenesis, and mutational spectra; cell death by apoptosis; genetic toxicity testing. (5 credits) Not offered 1995-96.

TOX 250cd. Molecular and Cellular Toxicology (Demple)
Examines key issues and approaches in modern toxicology, focusing on emerging research at the molecular and cellular levels. Topics include genetic toxicology, pathology of the cell cycle, carcinogenesis, molecular epidemiology, and risk analysis. (5 credits) Offered 1995-96 and alternate years.

Tutorial Programs
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or to undertake specialized readings or studies in molecular, cellular, biochemical, and environmental toxicology.

Faculty

Department Chair: Armen H. Tashjian, Jr., MD (Harvard University); Professor of Toxicology; Professor of Biological Chemistry and Molecular Pharmacology, Harvard Medical School. Development and exploitation of differentiated cell culture systems for mechanistic studies on uptake, metabolism, and cytotoxic actions of environmental chemicals; mechanism of action for tumor promoters; genetic and biochemical studies in hereditary human cancer; membrane transduction and signaling mechanisms.

Bruce Demple, PhD (University of California, Berkeley); Professor of Toxicology. Repair enzymes for oxidative DNA damage; molecular biology of cellular responses to oxidative stress.

Leona D. Samson, PhD (London University); Professor of Toxicology. Cell response to DNA damage at the biological, biochemical, and genetic levels; mechanisms of mutagenesis and cell killing.

Robert H. Schiestl, PhD (University of Vienna); Assistant Professor of Toxicology. Mechanisms of DNA repair and recombination with relevance to carcinogenesis and gene targeting, examined through studies carried out in the yeast *Saccharomyces cerevisiae* in human and mouse cells and in transgenic animals.

Robert Schlegel, MPH, PhD (University of California, Berkeley); Associate Professor of Toxicology. Molecular and biochemical events regulating apoptosis and cell cycle events in mammalian cells and the mechanisms by which DNA damage, chemical exposures, viral oncogenes, and cell immortalization alter this regulation.

Adjunct Faculty

Judith K. Marquis, PhD; Director of Preclinical Development, Procept, Inc.

Peter Ofner, MRSC, PhD; Associate Professor, Department of Pharmacology and Experimental Therapeutics, Tufts University School of Medicine.

Yuji Tanaka, MD; Assistant Professor of Medicine, University of Tokyo School of Medicine.

DEPARTMENT OF NUTRITION

The mission of the Department of Nutrition is to improve human health through enhanced nutrition. The department strives to accomplish this goal through research aimed at improved understanding of how diet influences health, the dissemination of new knowledge about nutrition to health professionals and the public, the development of strategies to enhance nutrition, and the education of researchers and practitioners.

William Owusu
SD/Nutrition

William is developing his expertise in nutritional epidemiology under the guidance of faculty member Graham Colditz, with a long-term goal of teaching and doing research in his native Ghana. "I am attached to one of the research groups that is examining dietary practice," he says. "I find that there are several areas of specialization in the department to choose from and enormous integration of the sciences here. This is what is most interesting at the school."

Grounded in biochemistry and nutrition from his undergraduate work in Ghana and in Canada, William was impressed by the number of Harvard studies under way in the field of nutrition. "My faculty advisor recommended that I look into HSPH, and when I read further descriptions of research being done at the school I decided to come." He hopes to return to Ghana and resume field work assessing nutritional status of communities in the Accra region, linking this with levels of schooling, types of jobs, and other indices. "This is a very important area of research for my home."

The Department of Nutrition provides training and research opportunities in basic science relating to nutrition and in epidemiologic aspects of nutrition as they affect public health. Nutrition policy and the evaluation of nutritional interventions are long-standing interests of the department, particularly as they concern the populations of Latin America, Africa, Asia, and the United States. Interests of the department range from molecular biology to human studies of cancer and heart disease. Students learn and use the latest techniques in biochemistry, physiology, biostatistics, epidemiology, and related fields. Departmental research, whether basic or applied, is relevant to human health.

Current research covers a wide range of topics, including large prospective studies of dietary factors in relation to heart disease, cancer, diabetes, and ophthalmologic disease; development of methods to assess nutritional status by an analysis of body tissue; the interaction of nutritional factors with genetic determinants of disease; the interaction of nutritional factors and infectious agents; nutritional influence on blood pressure; effects of nutrition programs on the mental and physical consequences of malnutrition; nutritional determinants of blood lipid factors; lipoprotein metabolism; and regulation of the intra- and inter-cellular delivery of macromolecular nutrients.

Positions taken by recent graduates of the department include faculty and postdoctoral research positions at schools of medicine, schools of public health, and departments of biochemistry; nutrition research director at a major food company; community nutritionist for a state health project; local health clinic administrator; food analytical chemist for an industrial firm; nutritionist for a federal nutrition evaluation agency; and nutrition educator for a Tunisian institute.

As described below, the department offers two doctoral programs. The first is a program in nutritional epidemiology/international nutrition leading to the Doctor of Science (SD) or Doctor of Public Health (DPH) degree. The second is a Doctor of Philosophy (PhD) program in nutritional biochemistry, offered through the Biological Sciences in Public Health Program (a component of the Division of Medical Sciences, Graduate School of Arts and Sciences). Applicants for the nutritional biochemistry program who hold a clinical degree in medicine, veterinary medicine, or dentistry may elect to follow a different curriculum leading to the Doctor of Science (SD) degree; this option may be available by special arrangement with the department. Please refer to page 7 for information about the Master of Public Health concentration in Public Management and Community Health.

Doctor of Science in Nutrition/Doctor of Public Health

The program in Nutritional Epidemiology/International Nutrition leading to an SD or a DPH degree provides rigorous training in epidemiology and biostatistics as well as the biological aspects of nutrition. The overall objective is to enable students to investigate relationships between diet and disease.

The program includes formal course work, a practical research project, a seminar, and a thesis research project. Students must pass the departmental oral comprehensive examination and the school-wide oral qualifying examination and must complete, defend, and submit a thesis. In addition to fulfilling the school-wide doctoral requirements in introductory epidemiology (EPI 200a or EPI 201a) and intermediate biostatistics (BIO 210cd or BIO 211cd), students must complete a major (20 credits) in nutrition and two minors (10 credits each), one of which must be epidemiology. Students in a joint program with the Department of Epidemiology must satisfy the course requirements of both departments, select a minor field acceptable to both departments, and write a thesis on a topic concerning both nutrition and epidemiology.

Applicants must have a strong background in biology and mathematics. An MD or other professional health-related degree is desirable but not required. Admission to a joint program with Epidemiology requires the approval of both departments, and applicants should contact the Department of Nutrition before making formal application.

Doctor of Philosophy in Biological Sciences in Public Health (BPH) (Nutritional Biochemistry)

Students wishing to study cellular and molecular biology or physiology as they pertain to major problems in public health should apply to the Biological Sciences in Public Health program. This program offers the PhD degree through Harvard University's Graduate School of Arts and Sciences, Division of Medical Sciences, Committee on Biological Sciences in Public Health.

The PhD program in nutritional biochemistry provides students with rigorous training in biochemistry, cell biology, and metabolism that allows them to work toward solving nutritional and metabolic problems in the laboratory. The program also offers a firm foundation in epidemiology and biostatistics. Specific courses supplement this core, as dictated by individual research concentrations. Students in this program engage in laboratory rotations in three different research areas, to enable them to assess realistically their interests in a thesis project and to evaluate the suitability of the laboratory and the mentor. At the completion of these rotations, students select an area of concentration and a thesis research laboratory and complete the required curriculum. A qualifying examination must be passed before engaging in thesis work, and the thesis must be defended before the granting of the PhD. Some students also participate in the Harvard-Markey Biomedical Scientist Training Program, a new pathway of graduate education designed to offer PhD students a greater knowledge of human biology and disease.

Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Those deficient in one of these areas may be admitted provisionally on the condition that appropriate courses will be taken before

For more information about the program in Nutritional Epidemiology/International Nutrition, or about any other aspect of the department, please contact Avtar Khalsa, Department of Nutrition, 655 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4657
Fax: 617-432-2435
E-mail: akhalsa@sph.harvard.edu

For application materials and information about admission to the PhD program, please contact the Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Room 435, Boston, MA 02115.
Phone: 617-432-0162

Applicants who have specific questions about the PhD program may contact Ruth Kenworthy, Division of Biological Sciences, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4470
Fax: 617-432-4098
E-mail: kenworthy@cvlab.harvard.edu

Faculty

Department Chair: Walter C. Willett, MD (University of Michigan), MPH, DPH (Harvard University); Fredrick John Stare Professor of Epidemiology and Nutrition; Professor of Medicine, Harvard Medical School. Relation of dietary factors to the occurrence of human disease, in particular heart disease and cancer; development of methods to study these associations in epidemiological settings.

Alberto Ascherio, MD (University of Milan), Diploma (London School of Hygiene and Tropical Medicine), MPH, DPH (Harvard University); Assistant Professor of Nutrition and Epidemiology. Relation of dietary factors to the occurrence of human disease; development of methods to study these associations in developing countries; health and human rights.

Professor Walter Willett, who warns against the dangers of trans fatty acids, is enthusiastic about the benefits of olive oil.

Faculty

Peter Goldman, AM (Harvard University), MD (Johns Hopkins University); Professor of Health Sciences in Nutrition; Maxwell Finland Professor of Clinical Pharmacology, Harvard Medical School. Metabolism of drugs and food constituents, particularly as carried out by intestinal bacteria, with emphasis on areas of metabolism that may help to provide an understanding of a compound's biological activity; causes of animal obesity.

M. Guillermo Herrera-Acena, MD (Harvard University); Lecturer on Nutrition. Epidemiology of protein-energy malnutrition and vitamin A deficiency; role of nutrition and other environmental factors in the etiology and management of diabetes mellitus.

Karen E. Peterson, RD (Peter B. Brigham Hospital), SD (Harvard University); Assistant Professor of Nutrition (Maternal and Child Health and Nutrition). Epidemiology of malnutrition in industrialized and developing countries; methodological issues affecting interpretation of growth and nutritional status indicators; design and evaluation of community-based nutrition interventions.

Eric B. Rimm, SD (Harvard University); Assistant Professor of Epidemiology and Nutrition. Relation of dietary factors to the occurrence of human diseases, in particular cardiovascular disease; development of nutritional epidemiological methods to study these associations.

Meir J. Stampfer, MD (New York University), MPH, DPH (Harvard University); Professor of Epidemiology and Nutrition. Cardiovascular disease; dietary etiologies of chronic diseases, especially cancer, heart disease, and diabetes; health effects of oral contraceptives and post-menopausal hormones.

Marianne Wessling-Resnick, MS (University of Chicago), PhD (University of Massachusetts Medical School); Associate Professor of Nutrition. Regulation of the cellular uptake of macromolecular nutrients; molecular basis of iron transport.

and/or after entering the program. Applicants must take both the GRE general and subject tests by October in order to meet the application deadline of December 15.

All students admitted to the program receive a stipend and tuition support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends. While funds to support international students are limited, one special scholarship is available each year for a student from a developing, sub-Saharan African country. There is also a university-wide fellowship program that provides funding to qualified underrepresented minority students in the sciences.

Graduates ordinarily assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. Career opportunities in the biological sciences as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Courses Offered by the Department of Nutrition, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

NUT 201b. Principles of Nutrition (Lo)
Emphasizes basic concepts of nutrition, including relationships between nutrition and problems such as cancer and heart disease. (2.5 credits)

NUT 202cd. The Science of Human Nutrition (P. Goldman)
Reviews the biochemistry of carbohydrates, fats, proteins, vitamins, and minerals in the context of human disease. Emphasizes current knowledge of the mechanisms that may explain the role of diet in the causation and/or prevention of ischemic heart disease, diabetes, obesity, hypertension, and cancer. (5 credits)

NUT 204cd. Departmental Seminars (P. Goldman)
Enables students to review and analyze recent key papers that provide either epidemiological or laboratory evidence that bears on a topic of current interest in human nutrition. Teaches skills necessary for oral presentation. (2.5 credits)

NUT 205ab. Advanced Topics in Nutrition (Wessling-Resnick)
Extends NUT 204cd by allowing students to participate in and present seminars reviewing current research and publications related to nutrition, and to attend advanced seminars presented by faculty and guest speakers. Provides practical training in communication skills for oral presentation. (2.5 credits)

NUT 207cd. Scientific Writing in Nutrition (Stampfer)
Covers organization of scientific papers, presentation of data in graphical and tabular forms, and style. Designed for advanced students beginning to work on a paper for publication. (2.5 credits)

NUT 209ab. Food Science and Nutrition (Herrera-Acena)
Focuses on the foods which supply human nutrient needs, their composition and physical properties, the positive and negative effects of genetic manipulation on nutrient qualities of food, agricultural practice, processing, storage, and cooking. (2.5 credits) Not offered 1995-96.

NUT 210cd. Nutritional Problems of Less-Developed Countries (Herrera-Acena)
Discusses the nutrition problems of less-developed countries in the context of basic human needs. Reviews the ecology and the biological and behavioral consequences of malnutrition and emphasizes issues in human biology relevant to the formulation of nutrition policy and programs. (2.5 credits)

NUT 214abcd. Research Techniques in Nutritional Biochemistry (Wessling-Resnick)
Enables students to rotate through the laboratories of faculty members in the Nutritional Biochemistry Program in order to learn current techniques applied to nutritional, cellular, and biochemical research. (10 credits)

NUE 216cd. Nutritional Epidemiology (Willett, Hankinson)
Reviews methods for assessing the dietary intake of populations and individuals. Students gain experience in the collection, analysis, and interpretation of dietary intake data, and learn to integrate information from international studies, secular trends, clinical trials, analytical epidemiology, and animal experiments. (2.5 credits)

NUE 218ab. Advanced Nutritional Epidemiology (Ascherio)
Addresses methodological aspects of research in nutritional epidemiology. Topics include theoretical and practical aspects of validation studies, adjustment for energy intake, and correction of measurement error. (2.5 credits) Not offered 1995-96.

NUT 301abcd. Nutrition/Health Promotion in the Mass Media (Willett, Cheung)
Focuses on the role of the mass media in the promotion and adoption of healthy eating practices; the extent and quality of coverage in various mass media outlets; creating messages for mass media use; and the effectiveness of existing mass communication campaigns in nutrition. (Credit to be arranged)

Tutorial Programs
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in laboratory studies, projects in applied nutrition, or library research.

Faculty

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School.

Edward L. Giovannucci, MD (University of Pittsburgh), MPH, SD (Harvard University); Assistant Professor in the Department of Nutrition. Etiologies of cancer with emphasis on dietary causes; methodologies to measure dietary factors in epidemiologic studies.

Clifford W. Lo, MD (John Burns School of Medicine), MPH (University of California, Los Angeles), ScD (Massachusetts Institute of Technology); Lecturer in the Department of Nutrition. Calcium, vitamin D, and parathyroid metabolism; total parenteral nutrition and nutritional support; intestinal absorption and gastrointestinal immunity.

Frank M. Sacks, MD (Columbia University); Associate Professor in the Department of Nutrition. Human lipoprotein metabolism; effects of diet and hormones; dietary fatty acids, cardiovascular disease, and cancer.

W. Allan Walker, MD (Washington University); Professor in the Department of Nutrition. Gastrointestinal immunology; developmental gastroenterology; protective functions of breast milk; macromolecular transport; nutritional effect of gastrointestinal mucosal barrier; intestinal gene expression.

Adjunct Faculty

Balz B. Frei, PhD; Associate Professor of Medicine and Biochemistry, Boston University.

Antonia Polychronopoulou-Trichopoulou, MD, PhD, MPH; Professor and Director, Department of Nutrition and Biochemistry, Athens School of Public Health.

DEPARTMENT OF POPULATION AND INTERNATIONAL HEALTH

The goal of the Department of Population and International Health is to help people and institutions in developing countries meet the challenge of improving health within the context of severely constrained resources. To achieve this goal, the department has mobilized a critical mass of faculty, students, and research fellows to generate knowledge through interdisciplinary research, to strengthen skills and capacities through education, and to promote international scientific cooperation through collaborative activities overseas.

Ramesh Govindaraj
SD/Population and International Health

While a young physician working on the outskirts of New Delhi, India, Ramesh was confronted by a resident who complained about the lack of clean drinking water in the shanty town. "In dramatic fashion, this man actually dipped a cup into an open sewer ditch, drank the water, and demanded to know what we were going to do. His point was that we had to do more than just evaluate health status and tend to individual patients—we needed to change fundamental conditions," Ramesh recalls.

The incident made a deep impression and led to his enrollment at HSPH in 1988. Currently working on a doctoral study of economics, political theory, and pharmaceutical policies in developing countries, Ramesh is collaborating with the World Health Organization and the Karolinska Institute in Sweden. "We're evaluating national drug programs in several developing countries to compare elements of pharmaceutical policy. It's actually one of the more under-researched areas which plays such an important role in health care delivery." After HSPH, Ramesh plans to teach and continue research in public health or public policy.

The mission of the Department of Population and International Health is based on a philosophy of global health equity in which mutual learning and exchange are fostered through an independent university base committed to scholarship and education. World population and health are in rapid transition in the late twentieth century, and dynamic changes in demography, health threats, and health policy responses are under way in virtually all societies, rich and poor. In developing countries, research and education are essential to the diagnosis of public health problems, the development of innovative policy responses, the application of new health technologies, and the expansion of basic and applied knowledge.

Faculty in the department are specialists in various disciplines associated with population and international health: anthropology, demography, ecology, economics, epidemiology, ethics, nutrition, politics, reproductive biology, and sociology. Their research spans a wide spectrum of interests, including aspects of economic development, health policy, and demography; design and financing of health care systems; reproductive health and child survival; human rights; and programs concerned with the prevention and control of malnutrition, AIDS, tuberculosis, cholera, and diarrheal diseases.

Students in the department come from a variety of backgrounds. Most have had advanced training in the biological or social sciences or extensive experience in applied fields relevant to population sciences, although some have only bachelor's-level training in these fields. Many students are from developing countries, and all have an interest in the health of disadvantaged populations worldwide.

As described below, the department offers both a four-semester Master of Science (SM) program and a program leading to the Doctor of Science

(SD) or Doctor of Public Health (DPH) degree. In addition to these degree programs, the department hosts research fellows and short-term executive trainees in population and health research, and supervises cooperative technical projects overseas. Please see page 7 for information about the Master of Public Health concentration in International Health.

Master of Science in Population and International Health

The SM program, which is completed in four semesters, equips students with the skills and knowledge required by professional organizations active in the fields of population and international health. Recent graduates have taken such positions as consultant on family planning and service delivery in women's health for United Nations' organizations, consultant to the Population Council, and senior positions in a wide variety of organizations and institutions both in the US and overseas. For those seeking an academic career, it is often possible to proceed from the SM to the doctoral program.

Applicants must have a bachelor's degree or equivalent, though many students hold advanced degrees in related areas such as medicine, nursing, social work, or a social science discipline. Preference is given to those with relevant work experience.

Of the 80 credits necessary to complete the SM program, 25 must be earned in courses selected from a list of core courses representing the four areas in which department faculty specialize: demography, reproductive health, international health policy and economics, and international health epidemiology and ecology. Students must complete additional core requirements in biostatistics, epidemiology, environmental health, health policy and management, and social and behavioral sciences. A 5-credit master's thesis is also required.

The first year of study is usually devoted to full-time course work. During the summer between the first and second years, students are encouraged to undertake internships providing practical experience in population and international health. The second year usually involves a combination of course work and completion of the thesis.

Doctor of Science in Population and International Health/Doctor of Public Health

The doctoral programs prepare students to assume professional leadership positions in public health in their own country or with international agencies, foundations, and organizations, or to undertake academic careers. Recent graduates have taken positions such as director of population and epidemiology in a national ministry of health and director of a population research organization.

The programs are designed for those who have achieved an outstanding record in the master's program or in an equivalent program at another university. The SD program is intended for those holding a master's degree in social sciences, economics, statistics, mathematics, law, or one of the non-medical sciences. Candidates with exceptional preparation may be admitted without a master's degree. The DPH program is customarily restricted to persons holding a degree in medicine, dental medicine, or veterinary medicine and a Master of Public Health degree from an approved institution. After admission, both degrees have identical course, examination, and thesis requirements.

A minimum of two academic years of full-time residence at the graduate level is required. The first year is ordinarily devoted to course work. The second year usually involves both course work and research planning. Subsequently, additional courses are taken to fulfill remaining requirements and/or to gain special skills related to thesis research. The pace of progress depends largely on the student's individual plan, which is designed in collaboration with an advisor and thesis committee. Ultimately, students must demonstrate detailed knowledge and understanding of a major field (20 credits) and two minor fields (10 credits each), must pass both the departmental written examination and the school-wide oral qualifying examination, and must prepare, defend, and submit a thesis based on original research.

The major field must be chosen from one of the four areas of concentration offered by the department, as described below. Minor fields may also be chosen from the department or from allied departments of the school or university, in-

For more information about programs in Population and International Health, please contact the Education Office, Department of Population and International Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2253
Fax: 617-566-0365
E-mail: ajaimong@sph.harvard.edu

Faculty

Department Chair: Lincoln C. Chen, MD (Harvard University), MPH (Johns Hopkins University); Taro Takemi Professor of International Health and Director of the Harvard Center for Population and Development Studies. Cholera and diarrheal diseases; epidemiology of malnutrition; demography, mortality, and health policy in developing countries.

Iain W. Aitken, BM (Cambridge University), MPH (Harvard University); Lecturer on International Health. Maternal health care; management of primary health care workers; design and financing of urban health care systems in developing countries.

William Alonso, MCP (Harvard University), PhD (University of Pennsylvania); Richard Saltonstall Professor of Population Policy; Member of the Faculty of Arts and Sciences. Issues of regional development; migration policies.

Peter A. Berman, MSc, PhD (Cornell University); Associate Professor of International Health Economics. Health care financing in developing countries; economic assessment of health policies and programs.

Richard A. Cash, MD (New York University), MPH (Johns Hopkins University); Lecturer on International Health; Institute Fellow, Harvard Institute for International Development. Health systems for rural and urban populations in developing countries.

Arthur J. Dyck, AM (University of Kansas), PhD (Harvard University); Mary B. Saltonstall Professor of Population Ethics; Member of the Faculty, Harvard Divinity School. Concepts of human rights, including ethical issues.

Timothy G. Evans, DPhil (Oxford University), MD (McMaster University); Assistant Professor of International Health Economics. The impact and assessment of chronic disease; assessment of blindness and the associate mortality, morbidity, and socioeconomic sequelae.

Faculty

Joseph J. Harrington, AM, PhD (Harvard University); Professor of Environmental Health Engineering (Environmental Health and Population and International Health); Gordon McKay Professor of Environmental Engineering, Faculty of Arts and Sciences. Water resources planning and quality management; environmental monitoring and control systems; applied statistics for modeling; management for tropical disease control.

Allan G. Hill, PhD (University College, Durham), Diploma in Demography (Princeton University); Andelot Professor of Demography. Demography of the Middle East and West Africa; impact on mortality of child survival programs.

A. K. Nanda Kumar, MSc (Bangalore University), MA, PhD (Boston University); Assistant Professor of Population and International Health Economics. Public and private roles in financing and providing health care services; econometric models of demand and demand equations for health care in developing countries.

Ulla M. Larsen, MA (Odense University, Denmark), PhD (Princeton University); Assistant Professor of Demography. Interface of demography and health; sterility and reproductive health; focus on Africa.

Richard Levins, PhD (Columbia University); John Rock Professor of Population Sciences. Human ecology; viability of populations and environments; special interest in Caribbean region.

Jonathan M. Mann, MD (Washington University), MPH (Harvard University); François-Xavier Bagnoud Professor of Health and Human Rights, Professor of Epidemiology and International Health, and Director of the François-Xavier Bagnoud Center for Health and Human Rights. AIDS, HIV infection, and communicable disease epidemiology; health and human rights; epidemiology and health policy.

Christopher J. L. Murray, MD (Harvard University), DPhil (Oxford University); Associate Professor of International Health Economics. Tuberculosis control strategies, with an emphasis on cost-effectiveness; health transition studies.

Carla M. Obermeyer, MA, MSc (American University of Beirut), SD (Harvard University); Associate Professor of Population and Anthropology. Utilization of maternal and child health services in the Middle East and Africa.

cluding the Departments of Biostatistics, Epidemiology, Health and Social Behavior, Tropical Public Health, Nutrition, or Maternal and Child Health. The departmental concentrations promote skill development, encourage multidisciplinary approaches to health problems, and provide opportunities for extensive linkages in diverse field settings in Africa, Asia, or Latin America.

Demography This concentration focuses on key concepts and methods used in the study of health, mortality, and fertility of human populations. The aim is to demonstrate the bearing of demographic factors on health and to develop the population-based view of public health issues internationally. The concentration reflects the department's strong interest in the Indian subcontinent, the Middle East and North Africa, and sub-Saharan Africa.

In an introductory course, students acquire the basic skills to measure demographic trends and to understand how fertility, mortality, and age structure are linked. In more advanced classes, analytic techniques for the study of mortality, fertility, and their proximate determinants are presented largely through the use of case studies. Other courses deal with population policies and their impact on population growth; population and economic development; anthropological approaches to population and health issues; the effects of health interventions; measurement of a nation's burden of disease; household factors affecting health and mortality; and methods for the analysis of both longitudinal and cross-sectional demographic data.

Reproductive Health This concentration focuses on the physiologic basis of reproduction, global and regional prevalence of major reproductive health problems, their determinants and consequences, and the key policy and service strategies that have been promulgated to date. A core curriculum provides an introduction to these topics, and further course work normally reflects both a methodologic and a topical concentration. Faculty research in this area is concentrated in field-based or clinical epidemiology, demography, social anthropology, service research, or policy studies, and doctoral students are strongly encouraged to collect primary data, either in a field site or in a clinical population, for their thesis.

International Health Policy and Economics This concentration is designed for students who wish to develop skills and pursue research on health policies and health economics of developing countries, including institutional and political analysis, health economics and financing strategies, project planning and evaluation, and comparative economics. Students are expected to develop both quantitative and qualitative skills in the analysis of health policy or economics within the broader context of international development.

Students also develop methodologic or substantive expertise in the relationship between international development and health. Methods include case study techniques, survey research, experimental design, cost-effectiveness analysis, econometric methods, decision analysis, epidemiologic methods, and statistical methods for addressing policy and economic issues. Possible substantive minors include management and development, environment and development, demographics and policy, health and development, and evaluation of development efforts. Many methodological and substantive courses are offered in other Harvard schools.

International Health Epidemiology and Ecology This concentration is designed for those who wish to develop skills in epidemiology that will enable them to understand the determinants, consequences, and dynamics of health problems and to plan, implement, and evaluate health promotion and disease prevention strategies and programs. In the international context, the practice of epidemiology places particular emphasis on cross-cultural perspectives, the adaptation of methods to areas lacking technical infrastructure, and the optimal use of scarce resources.

A close collaboration exists in the department between the fields of epidemiology and human ecology, which overlap in the study of infectious and vector-borne diseases, health problems associated with contamination and development, and the health ecology of the workplace. The concentration emphasizes the development and application of statistical and other mathematical methods for the analysis of complex data. The program also taps the disciplinary support available in the Departments of Epidemiology, Biostatistics, and Tropical Public Health, encouraging students to combine epidemiological

Doctoral student Ritu Sadana (right) traveled to Cambodia to study women's perceptions of modern contraceptive technologies.

methods with other disciplinary skills, such as demography, anthropology, economics, and the policy or laboratory sciences.

Core requirements ensure that students obtain a basic mastery in general epidemiology, biostatistics, demography, and human ecology. Students unfamiliar with the complicated life cycles of parasites and the modes of transmission of tropical diseases are advised to take specialized courses in these areas. Various complementary courses in allied fields are also recommended, including environmental health, nutrition, and anthropology, both in other HSPH departments and at the Graduate School of Arts and Sciences.

Courses Offered by the Department of Population and International Health, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

PIH 191cd. Cities and Regions (Alonso)
Stresses the interaction of societies and their geographies, focusing on historic and current developments in the US. Considers demography, technology, institutions, ideology, health, the economy, and other factors. (5 credits)

PIH 200a. Introduction to World Population Issues (Chen, Hill)
Reviews the basic dimensions of world population. Topics include population change; the contribution of demographic sciences, family planning, and reproductive health programs to socioeconomic development; and the scientific, social, political, and ethical dimensions of population debates. (2.5 credits)

PIH 211b. Health Program Management in Developing Countries (Campbell)
Introduces topics critical to the successful administration of governmental and nongovernmental health programs in developing countries. Topics include strategic planning, social marketing, accounting, management control, and cost analysis. (2.5 credits)

PIH 212c. Sociocultural Dimensions of International Health (Heggenhougen)
Reviews the relevance of sociocultural factors and elaborates the contributions of medical anthropology to international public health. Topics include health-seeking behavior, professional and public health education, and anthropological approaches to tropical diseases. (2.5 credits)

Faculty

M. Omar Rahman, MD (Northwestern University), MPH, SD (Harvard University); Assistant Professor of Demography and Epidemiology (from January 1996). Healthy aging in rural societies; determinants of pregnancy outcomes in developing countries; assessment of adult health status and international comparisons of gender differences; assessment of quality of health care services; socioeconomic determinants of adult health.

Michael R. Reich, AM, PhD (Yale University); Professor of International Health Policy. Political economy of health and development; health consequences of development policy; health policy in Japan.

Hilton A. Salhanick, AM, PhD (Harvard University), MD (University of Utah); Frederick Lee Hisaw Professor of Reproductive Physiology; Professor of Obstetrics and Gynecology, Harvard Medical School. Synthesis, transport, and action of progesterone with emphasis on inhibiting one of the processes.

Rachel C. Snow, SD (Harvard University); Assistant Professor of Reproductive Health. Responsiveness of contraceptive policy to the biomedical characteristics of a population.

Grace Wyshak, SM (Harvard University), PhD (Yale University); Lecturer on Demography and Biostatistics (Population and International Health and Biostatistics). Biostatistical and demographic methods; women's reproductive health.

Chi-Man (Winnie) Yip, PhD (Massachusetts Institute of Technology); Assistant Professor of Population and International Health Economics. Application of economic models and econometric techniques to study of health care policies.

Arturo Cervantes, a graduate of the MPH program and now a doctoral student, participates in community activities coordinated by the Student Community Health Outreach Organization (SCHOOL).

PIH 213d. Management Information Systems for Third World Health Systems (Lamstein, Reich)
Explores theoretical and practical concepts of information systems design. Begins with basic concepts of management, information theory, and systems analysis and proceeds to develop a general understanding of the design considerations of MIS. (2.5 credits)

PIH 216d. Child Rights/Child Health (Gruskin, Mann)
Focuses on international human rights norms, institutions, and procedures and their application to selected topics in child health, including disability, refugee status, and HIV/AIDS infection. (1.25 credits)

PIH 217d. How Vulnerable Are We to HIV? (Tarantola, Mann)
Provides a method for assessing individual and collective vulnerability to the HIV/AIDS epidemic. Considers the sensitivity, specificity, and applicability of assessment methods at different stages of the pandemic. (1.25 credits)

PIH 218c. Health and Human Rights (Mann, Gruskin)
Topics include the impact of health policies and programs on human rights, health consequences of human rights violations, and the linkage between promoting and protecting health and promoting and protecting human rights. (2.5 credits)

PIH 220ab. Introduction to Demographic Methods (Gardner, Hill)
Presents the main demographic approaches to the study of population structure and dynamics, including data sources, age and sex composition, growth, fertility, nuptiality, and mortality. (2.5 credits)

PIH 221b. Analysis of Fertility and Proximate Determinants (Larsen)
Enables students to produce an analysis of recent patterns, trends, and differentials in fertility in a form useful for policy-making. Introduces data sources useful for estimating and interpreting fertility changes. (2.5 credits)

PIH 222c. Analysis of Mortality and Its Main Determinants (Hill)
Explains how childhood and adult mortality is measured when registration data are lacking. Shows how data from surveys and routinely collected health data may be used for mortality assessments. (2.5 credits)

PIH 225c. Qualitative Research Methods for Population and Health (Obermeyer)
Introduces the assessment and measurement of sociocultural factors in demographic and health research. Covers field methods in anthropology and the recording, management, and analysis of data. (2.5 credits)

PIH 227b. Anthropological Approaches to Demographic and Health Research (Obermeyer)
Uses the concepts and methods of anthropology to understand patterns of disease and reproduction in their cultural context. Students acquire a broader perspective on the cultural context of health and fertility behavior and learn about anthropological methods and research tools. (2.5 credits)

PIH 228d. Family, Gender, and Health (Hill, Das Gupta)
Reviews theoretical and empirical contributions to the study of the family and the household as these relate to health and demographic outcomes. Discusses the implications of patterns of household formation, power relations, and coping mechanisms. (2.5 credits)

PIH 229b. The Analysis of Event Histories (Larsen)
Increases familiarity with different event history analysis techniques, such as actuarial tables and Cox models. Emphasizes understanding the underlying theory and main assumptions, as well as the interpretation of results. (2.5 credits)

PIH 230cd, 231cd. Topics in International Reproductive Health (Snow, Aitken)
Provides in-depth analyses of the clinical epidemiology, physiology, and management of selected reproductive health problems. Topics include safe motherhood, reproductive tract infections, and fertility regulation. (5 credits each semester)

PIH 233b. Introduction to Reproductive Health (Aitken)
Introduces the anatomy and physiology of human reproduction, and covers the essential clinical features of common complications of pregnancy, childbirth, and reproductive tract infections. Discusses types of contraceptives and clinical procedures for abortion. (2.5 credits)

Faculty

The following faculty members have secondary appointments at HSPH. Their primary affiliation is with Harvard Medical School.

Mary Carlson, MA (University of Wisconsin), PhD (Northwestern University), MPA (Harvard University); Associate Professor in the Department of Population and International Health. Recovery of behavioral function after brain damage or sensory deprivation; consequences of social deprivation in institutionalized infants; child rights legislation.

Harald K. Heggenhougen, MA, PhD (New School for Social Research); Associate Professor in the Department of Population and International Health. Medical anthropology.

Mary E. Wilson, MD (University of Wisconsin); Assistant Professor in the Departments of Population and International Health and Epidemiology. Infections acquired during travel and residence in tropical and developing countries; determinants of geographic distribution of infectious diseases; meta-analysis of BCG studies.

PIP 240d. Political Economy of International Health Policy (Reich)
Examines issues of health and development in the context of international politics and economics. Explores ways in which relations between developed and developing countries affect the formulation and implementation of health policy and the impact of development policy on health. (2.5 credits)

PIH 241c. Health Planning in Developing Countries: Cost-Effective Analysis and Priority-Setting Techniques (Murray)
Teaches applied skills needed for the economic evaluation of health projects, interventions, and programs. Emphasizes cost-effectiveness and its use in sectoral resource allocation decisions, including ethical underpinnings. (2.5 credits)

PIH 242cd. Health and the Household Economy in Developing Countries (Berman)
Presents a multidisciplinary social science framework, emphasizing household economics, for analyzing household factors in health. Uses microeconomic models to understand linkages between health and household production, consumption and reproduction, and social relations functions. (2.5 credits) Not offered 1995-96.

PIH 244b. Health Policy and the Health Sector in Developing Countries (Berman)
Surveys health and health sector policies in developing countries and current methods for their analysis and reform. Introduces analytical tools for policy analysis related to financing, benefit packages, politics, health care organization, and consumer and household behavior. (2.5 credits)

PIH 245cd. International Population Policies: Lessons for the Next Century (Chen, Zeidenstein)
Analyzes ideologies and values, policies and programs, strategies and tactics, and attitudes and behaviors relating to international population. (2.5 credits) Not offered 1995-96.

PIH 246cd, 247cd. Doctoral Seminar in International Health Policy and Economics (Berman, Reich, Murray, Yip, Hsiao)
Explores important international health policy and economics research topics. Emphasizes theoretical frameworks, analytical techniques, empirical applications, and technical results. (1.25 credits each semester)

PIT 250b. Epidemiology of Infectious Diseases of Public Health Importance in Developing Countries (Cash)
Reviews the epidemiology of infectious diseases of public health importance in developing countries. Emphasizes epidemiologic patterns of bacterial and viral diseases as they relate to different geographic and socioeconomic environments. (2.5 credits)

PIH 251cd. Monitoring and Evaluation of Health Programs in Developing Countries (Hill, Cash)
Introduces the principles and practice of monitoring and evaluating health programs and interventions in developing countries. Reviews options for obtaining information and for the assessment of progress toward the goals of the World Summit for Children. (2.5 credits)

PIH 252d. Measurement of Health Status in Developing Countries (Evans, Chen)
Introduces values and principles underlying measures of health. Examines such health status measures as the SF36, QALYs, DFLEs, and DALYs, emphasizing quality, cost, sustainability, and relevance to health planning, monitoring, and evaluation. (2.5 credits)

PIH 253b. Human Ecology (Levins)
Provides a broad overview of the human ecosystem as it emerges out of, but differs from, pre-human ecology. Topics are selected from biosphere processes, population interaction, agricultural systems, adaptation evolution and ecology of disease, ecological politics, and evolution. (2.5 credits)

PIE 255b. AIDS: Responding to a Global Epidemic (Mann)
Presents a global perspective on the HIV/AIDS pandemic with emphasis on design and implementation of global AIDS strategy. Topics include recognition of the pandemic, strategy development, mobilization of resources, national programs and international cooperation, and human rights. (2.5 credits) Not offered 1995-96.

PIH 260bc. Student Project Design Seminar (Levins)
Requires each student to select a community and a health or population problem, and to present a critical survey of the relevant literature and a project design. Teaches students to understand problems in their broader contexts and inner structures and to turn insights into workable plans. (2.5 credits)

PIH 263e. Grant Writing for Funding of Research and Health Care Projects (Dumbaugh, Cash)
Provides participants with the opportunity to prepare a grant proposal for submission to a funding agency; a framework for writing proposals for research or other projects; and sources of information about organizations that fund such work. (1 credit)

Tutorial Programs
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research, undertake specialized readings, or carry out independent studies.

Adjunct Faculty

John C. Caldwell, PhD; Professor and Chairman, Department of Demography, Australian National University.

Adetokunbo O. Lucas, MD, SM; consultant.

The Takemi Program in International Health is a nondegree program offering fellowships for research and advanced training on critical issues of international health, especially those related to developing countries. The program is practical and interdisciplinary in nature, and addresses problems of mobilizing, allocating, and managing scarce resources to improve health, and of designing strategies for disease control and health promotion. Fellows' research is usually related to a policy problem in their own country.

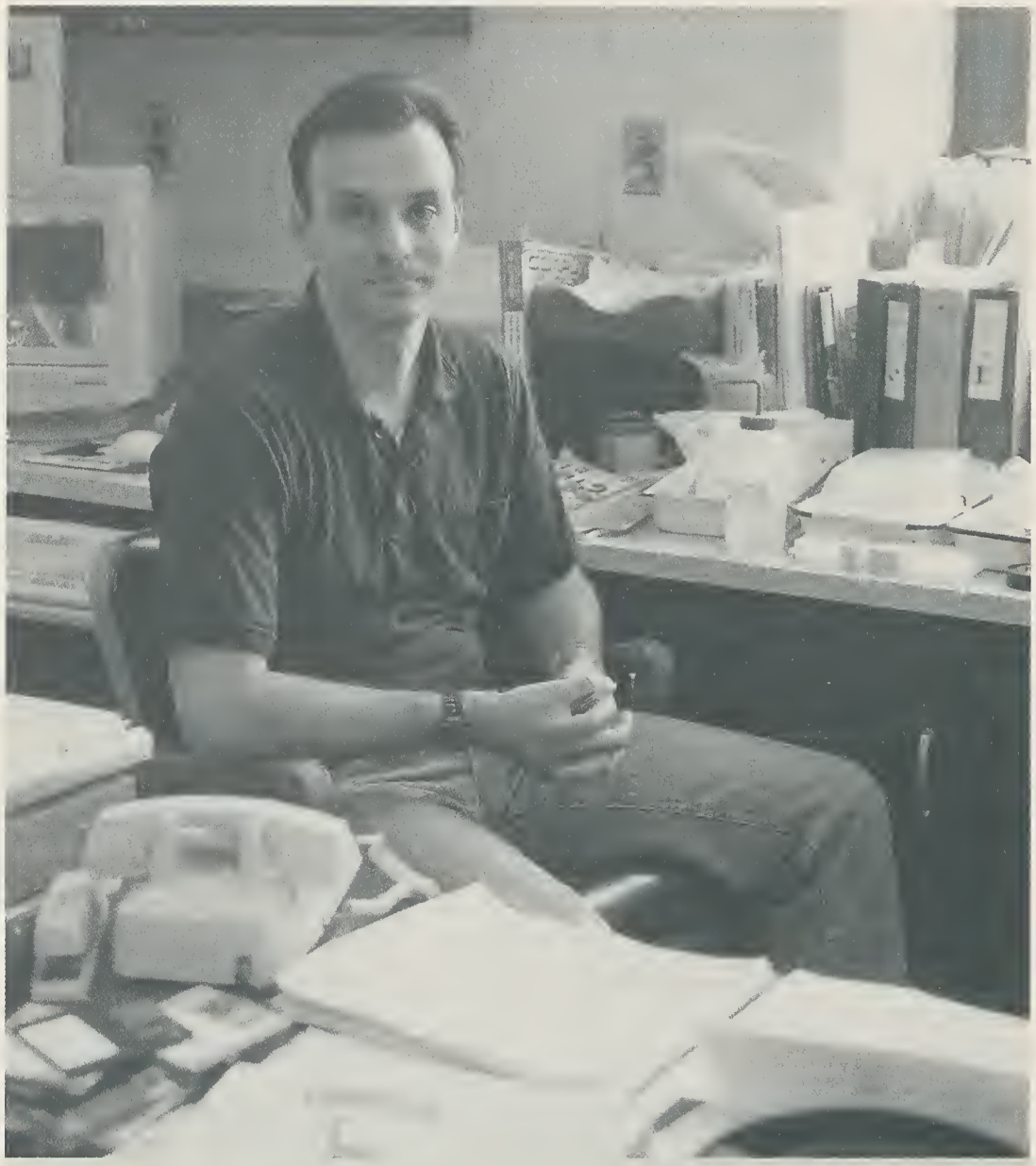
Takemi fellows are professionals and scholars from around the world with training and experience in public health, medicine, economics, policy analysis, biological science, and other fields. The program enables fellows in the early or middle stages of their careers to strengthen their knowledge of disciplines such as economics, epidemiology, policy formulation, political analysis, or the use of quantitative analytic methods. It is not designed for projects with biomedical laboratory requirements.

The program can fund a limited number of fellowships each year and can assist in identifying external sources of funding, which applicants are encouraged to pursue.

For more information, contact Michael R. Reich, PhD, Director of the Takemi Program in International Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0686
Fax: 617-432-1251
E-mail: lzahner@sph.harvard.edu

DEPARTMENT OF TROPICAL PUBLIC HEALTH

The Department of Tropical Public Health contributes to the health of people in the developing world through research and training focused on the biological and ecological aspects of protozoan and helminthic diseases, tuberculosis, and Lyme disease. The department offers opportunities for basic study of the biology of parasitism and applied research aimed at the development of vaccines and of improved tools for diagnosis and disease control.



Anthony Kiszewski
SD/Tropical Public Health

"Public health entomology is my field of study," says Anthony. "I'm working with vectors of Lyme disease—deer ticks—and studying certain aspects of their reproductive behavior to regulate their spread." Prior to coming to HSPH Anthony served five years in the US Navy, where he led a preventive medicine corps that conducted agricultural quarantine on trucks and vehicles returning from Operation Desert Storm. But an armed services career wasn't enough and he settled on HSPH, where there was a "diversity of learning opportunities. I've been able to study topics that I wasn't familiar with, like population genetics."

Currently working with Professor Andrew Spielman, Anthony combines the challenges of the laboratory with the risks of field work. "I've been in the field collecting ticks for experiments. My first spring here I contracted Lyme disease, which made me pretty popular around the lab."

"I recommend potential students to venture out, to work with people in other parts of the school, and to round out their experience by paying attention to fields not directly related to their majors."

Members of the Department of Tropical Public Health take a multidisciplinary approach to infectious diseases, which includes immunology, molecular biology, medical entomology, cell biology and ultrastructure, biochemistry, pathology, and epidemiology. They undertake research both within the school and overseas, in Brazil, Venezuela, Colombia, Mexico, Kenya, Sri Lanka, Egypt, Thailand, India, China, and Indonesia. Current departmental research includes immunology of schistosomiasis, leishmaniasis, filariasis, onchocerciasis, and tuberculosis; molecular biology of malaria, schistosomiasis, filariasis, amoebiasis, giardiasis, tuberculosis, and Lyme disease; development of specific DNA probes to detect infectious agents; epidemiology and control of malaria, schistosomiasis, and leishmaniasis; pathogenesis of lymphatic filariasis and onchocerciasis; and public health entomology and ecology of Lyme disease.

Applicants should have a background in biological sciences. They must hold at least a bachelor's degree, but may enter at any level of advanced training. Applicants with a doctoral degree in medicine, dentistry, veterinary medicine, behavioral sciences, other natural and social sciences, law, economics, and engineering are also considered for admission.

In addition to meeting school-wide core requirements in biostatistics and epidemiology, all students in the department are required to take TPH 201a, *Ecology, Epidemiology, and Control of Important Parasitic Diseases of Developing Areas*; at least 7.5 credits (5 credits for students in two-semester programs) in parasite and/or vector biology, including TPH 208cd, *Immunology of Parasitic Infection*, or TPH 216cd, *Cellular and Molecular Biology of Parasites*, and TPH 206d, *Principles of Public Health Entomology*; and ID 201cd, *Biology, Epidemiology, Economics, and Policy* (BEEP): *Malaria*, or ID 203cd,

Tuberculosis. Students in the four-semester program also must take at least 5 credits in biochemistry, cell biology, genetics, population genetics, or immunology at HSPH or other Harvard schools, and 10 credits of research. Students in the four-semester program who expect to pursue professional, rather than academic, careers must also complete core courses in environmental health, health policy and management, and social and behavioral sciences. Students in the doctoral programs must take additional advanced coursework, pass a qualifying examination, and complete thesis research.

As described below, the department offers both a four-semester and a two-semester Master of Science (SM) program, a program leading to the Doctor of Science (SD) degree, and a Doctor of Philosophy (PhD) program offered through the Biological Sciences in Public Health Program (a component of the Division of Medical Sciences, Graduate School of Arts and Sciences). Please see page 7 for information about the Master of Public Health concentration in International Health. The department offers four concentrations, each applicable to one or more of the degree programs.

Tropical Public Health This concentration, in which students may earn a two-semester or a four-semester SM degree, provides students with the background necessary for research or service careers in developing countries. Master's degrees in tropical public health can lead to positions within the health policy and technology industry, as well as at the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). The two-semester program provides a background in infectious diseases useful to practicing physicians and field researchers.

In addition to the core courses outlined above, focused course work tailored to the student's interests is strongly encouraged within immunology, microbiology, cell biology, or parasitology.

Vector Biology, Ecology, and Control This concentration, in which the department offers a four-semester SM program and an SD program, combines biology, epidemiology, and field work. Students are introduced to the various arthropod vectors of human infection and gain an appreciation for the biology of these organisms and the means for their control. The concentration develops skills with respect to identification, maintenance, and experimental procedures involving these organisms, and is designed to prepare students to direct intervention against vector-borne disease through the planning and evaluation of control programs. Doctoral students conduct basic studies on the mechanism of transmission of vector-borne pathogens and devise novel methods of intervention.

In addition to completing the core courses outlined above, students are encouraged to register for entomological and ecological courses in the Graduate School of Arts and Sciences.

Infectious Disease Epidemiology and International Health This concentration leads to a two-semester or four-semester SM degree or to an SD degree. The concentration provides a solid understanding of epidemiology, ecology, and control of infectious diseases in developing countries. It emphasizes control and prevention measures, and theoretical and practical epidemiologic approaches to solving health problems under resource-constrained circumstances. Graduates fill positions as consultants and leaders in field-based projects, international health organizations, or governmental agencies. The two-semester program provides a useful background for physicians practicing in developing countries or involved with infectious disease teaching or research.

In addition to completing the core courses outlined above, students in this concentration must take PIT 250b, *Epidemiology of Infectious Diseases of Public Health Importance in Developing Countries* (described under Population and International Health), and may elect to take TPH 204d, *Introduction to the Techniques of Investigation of Parasitic Infections,* or TPH 205c, *Clinical and Pathologic Features of Tropical Diseases,* in place of TPH 206d, *Principles of Public Health Entomology.*

Recommended electives include NUT 210cd, *Nutritional Problems of Less-Developed Countries* (described under Nutrition), as well as upper-level epidemiology and biostatistics courses, and courses dealing with the epidemiology of infectious diseases, such as EPI 214d, *Epidemiologic Analysis of Outbreaks and Infectious Diseases* (described under Epidemiology); PIH

For more information about the SM and SD programs, please contact the Department of Tropical Public Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1201
Fax: 617-738-4914

For application materials and information about admission to the PhD program, please contact the Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Room 435, Boston, MA 02115.
Phone: 617-432-0162

Applicants who have specific questions about the PhD program may contact Ruth Kenworthy, Division of Biological Sciences, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4470
Fax: 617-432-4098
E-mail: kenworthy@cvlab.harvard.edu

Faculty

Department Chair: John R. David, MD (University of Chicago); Richard Pearson Strong Professor of Tropical Public Health; Professor of Medicine, Harvard Medical School. Immunology of migration inhibitory factor (MIF) and its potential as an adjuvant for new vaccines; the biologic role of rMIF; the biology of parasitism, encompassing leishmaniasis and schistosomiasis; transfer of technology from bench to field site (Brazil) on problems of host resistance, risk factors, and control strategies.

Donald A. Harn, Jr., AM (University of Northern Colorado), PhD (University of California, Los Angeles); Professor of Tropical Public Health; Assistant Professor of Medicine, Harvard Medical School. Regulation, or direction, of immune responses due to the molecular composition of particular antigens.

Willy F. Piessens, MD (Free University of Brussels); Professor of Tropical Public Health; Associate Professor of Medicine, Harvard Medical School. Immunology and molecular biology of filarial nematodes; pathogenesis of lymphatic filariasis and onchocerciasis; regulation of cellular and humoral immune responses to molecularly defined recombinant parasite antigens.

John C. Samuelson, MD, PhD (Harvard University); Associate Professor of Tropical Public Health. Use of molecular biological and biochemical techniques to study *Entamoeba histolytica*, the protozoan parasite that causes amebic dysentery.

Charles B. Shoemaker, PhD (University of Iowa); Associate Professor of Tropical Public Health. Use of molecular biology to study aspects of the multicellular parasites causing the important tropical diseases; identification of surface membrane proteins as vaccine targets.

Andrew Spielman, DSc (Johns Hopkins University); Professor of Tropical Public Health. Epidemiology of vector-borne disease; physiology and ecology of mosquitoes and ticks; development of infectivity of pathogens in mosquitoes and ticks.

200a, *Introduction to World Population Issues*, and PIH 220ab, *Introduction to Demographic Methods* (both described under Population and International Health).

Immunology and Molecular Biology of Parasitic and Other Infections This concentration is designed for PhD students in the Biological Sciences in Public Health Program. It introduces students to recent advances in the biology of parasitic and infectious diseases and provides background for conducting research on these diseases. The program emphasizes molecular biology, immunology, cell biology, and the epidemiology of parasites.

Master of Science in Tropical Public Health (four-semester program)

Students in the four-semester SM program may choose to concentrate in Tropical Public Health; Vector Biology, Ecology, and Control; or Infectious Disease Epidemiology and International Health. Please refer to the concentration descriptions above for information about program requirements.

Master of Science in Tropical Public Health (two-semester program)

Students in the two-semester SM program may choose to concentrate in Tropical Public Health or Infectious Disease Epidemiology and International Health. Applicants must hold a previous doctoral degree in medicine, dentistry, or veterinary medicine, or an advanced degree in nursing. Please refer to the concentration descriptions above for information about program requirements.

Doctor of Science in Tropical Public Health

The SD program is designed for those primarily interested in field work or epidemiology. Students may choose to concentrate in Vector Biology, Ecology, and Control or Infectious Disease Epidemiology and International Health. All SD students must complete 60 credits of research, pass the school-wide oral qualifying examination, and complete, defend, and submit a thesis. Please see the concentration descriptions above for additional information about program requirements. There may be some funding available through a training grant for US citizens and permanent residents enrolled in the SD program.

Doctor of Philosophy in Biological Sciences in Public Health (BPH) (Immunology and Molecular Biology of Parasitic and Other Infections)

Students wishing to study cellular and molecular biology or physiology as they pertain to major problems in public health should apply to the Biological Sciences in Public Health program. This program offers the PhD degree through Harvard University's Graduate School of Arts and Sciences, Division of Medical Sciences, Committee on Biological Sciences in Public Health.

The PhD program affiliated with this department is designed to train young scientists in state-of-the-art concepts and methods in the biology of parasites and other important infectious diseases. The program offers a firm foundation in the basic biomedical sciences, as well as in epidemiology and biostatistics. Specific courses supplement this core, as dictated by individual research concentrations. Students in this program engage in laboratory rotations in three different research areas, to enable them to assess realistically their interests in a thesis project and to evaluate the suitability of the laboratory and the mentor. At the completion of these rotations, students select an area of concentration and a thesis research laboratory and complete the required curriculum. A qualifying examination must be passed before engaging in thesis work, and the thesis must be defended before the granting of the PhD. Some students also participate in the Harvard-Markey Biomedical Scientist Training Program, a new pathway of graduate education designed to offer PhD students a greater knowledge of human biology and disease.

Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Those deficient in one of these areas may be admitted provisionally on the condition that appropriate courses will be taken before and/or after entering the program. Applicants must take both the GRE general and subject tests by October in order to meet the application deadline of December 15.

All students admitted to the program receive a stipend and tuition support. Students are encouraged to apply for fellowships from outside sources since certain external fellowships provide higher stipends. While funds to support international students are limited, one special scholarship is available each year for a student from a developing, sub-Saharan African country. There is also a university-wide fellowship program that provides funding to qualified underrepresented minority students in the sciences.

Graduates ordinarily assume positions as faculty members and research scientists at medical schools, research institutes, and schools of public health. Career opportunities in the biological sciences as they apply to public health are expected to grow both in academia and in the biotechnology and pharmaceutical industries.

Courses Offered by the Department of Tropical Public Health, 1995-96

Please note that this list may be incomplete and is subject to change. Detailed course listings, including information about prerequisites, course activities, and scheduling, are distributed to students with registration information.

Letters following course numbers indicate the period(s) in which a course is given: a and b (fall quarters); c and d (spring quarters); e and f (one-week sessions in January and March); s and t (summer sessions).

ID 201cd. Biology, Epidemiology, Economics, and Policy (BEEP): Malaria (Spielman)
Exposes students to vector control, diagnosis, chemotherapy, and vaccines for malaria from the point of view of social, political, and economic policy. Evaluates the impact of programs from an international and local perspective using techniques from social and biomedical sciences. (2.5 credits)

ID 203cd. Tuberculosis (Piessens, Murray, Nardell)
Covers the immunobiology, epidemiology, and control of tuberculosis and the impact of HIV/AIDS, drug resistance, and compliance on tuberculosis transmission, control, and prevention. (5 credits)

TPH 201a. Ecology, Epidemiology, and Control of Important Parasitic Diseases of Developing Areas (Maguire)
Introduces ecological and epidemiologic concepts basic to the control of infectious agents. Considers parasitic diseases of significance in the developing areas of the world, and elucidates epidemiologic principles of vector-associated diseases. (3 credits)

TPH 204d. Introduction to the Techniques of Investigation of Parasitic Infections (Maguire, Telford)
Emphasizes laboratory methods for the study of parasitic diseases. Provides exposure to theory and application of techniques essential to epidemiologic and laboratory investigation. (2.5 credits)

TPH 205c. Clinical and Pathologic Features of Tropical Diseases (Maguire, von Lichtenberg)
Emphasizes the clinico-pathologic aspects of tropical diseases. Designed for students particularly interested in tropical medicine. (1.25 credits)

TPH 206d. Principles of Public Health Entomology (Spielman)
Discusses from ecological, physiological, and genetic points of view the manner in which arthropods transmit disease and the principles of vector control. Includes weekend field trips. (2.5 credits)

TPH 208cd. Immunology of Parasitic Infection (Harn)
Covers aspects of immune evasion, cell-mediated and humoral aspects of protective immunity, and immunopathology in protozoan helminth parasites of humans. Discusses antigenic variation, molecular mimicry, resistance to immune mechanisms, and vaccine development. (5 credits) Not offered 1995-96.

TPH 216cd. Cellular and Molecular Biology of Parasites (Harn)
Covers aspects of cell, developmental, and molecular biology of protozoan and helminth parasites of humans. Topics include novel membrane structures, mechanisms for drug development, and vector biology. (5 credits) Offered 1995-96 and alternate years.

TPH 226e. Water Resource Development in the Tropics: Big Dams, Big Canals, and Big Problems (Maguire)
Focuses on consequences of water resource development projects in the tropics, with an emphasis on health problems. Includes laboratory demonstrations of live vectors, agents of tropical disease, and principles of hydrology. Students present a mock negotiation over the design of a dam on the Nile River. (1 credit)

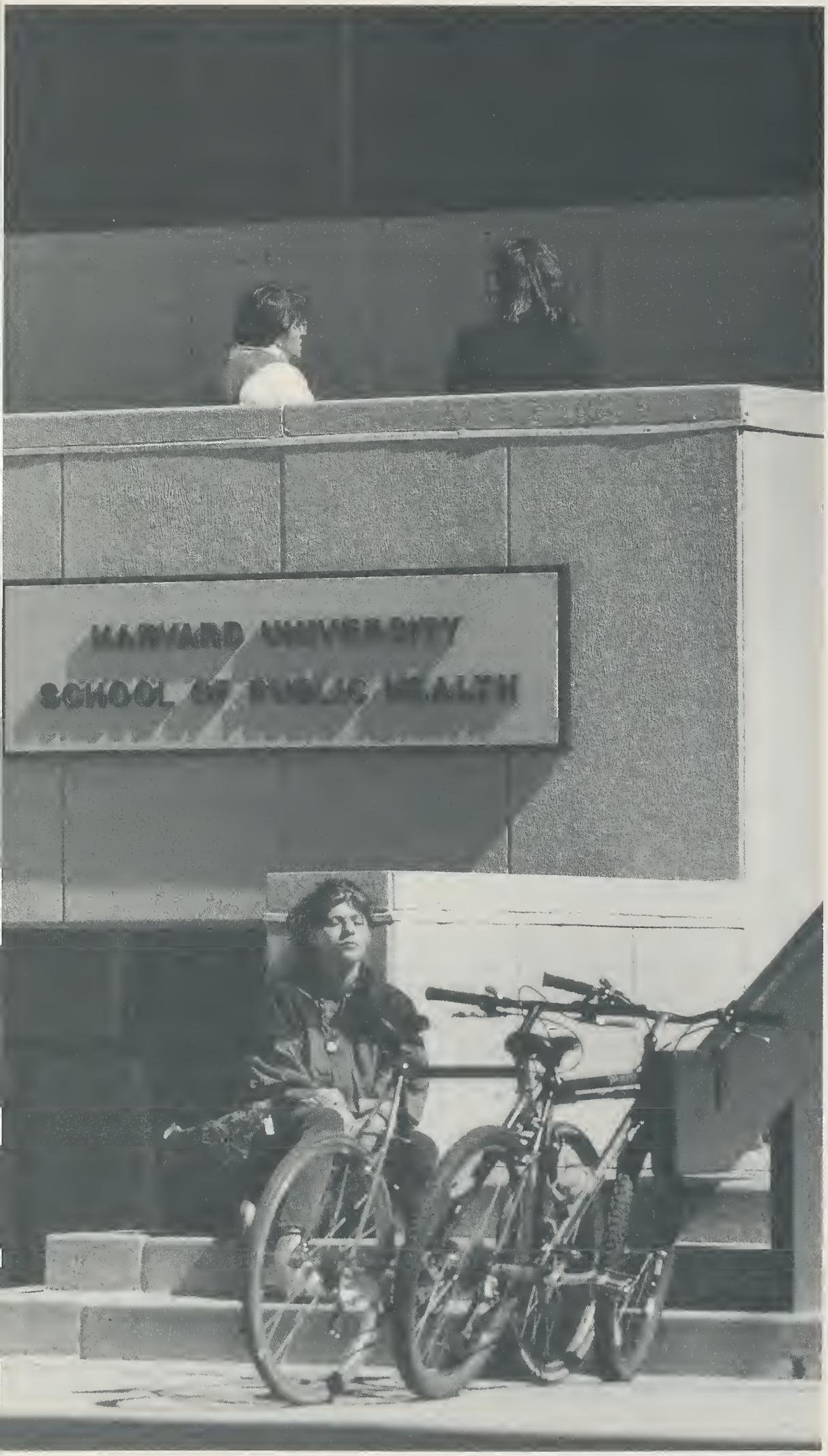
Tutorial Programs
Individual students or small groups of students who wish to go beyond the content of regularly scheduled courses may arrange with individual faculty members to participate in departmental research or undertake specialized readings or studies. Various parasites of medical importance are maintained and are available for studies on immunology, molecular biology, cell biology, biochemistry, and chemotherapy.

Faculty

Dyann F. Wirth, PhD (Massachusetts Institute of Technology); Professor of Tropical Public Health. Mechanisms of drug resistance in malaria, including molecular genetic analysis and field-based studies; genetic analysis of malaria transmission; analysis of gene expression; transsplicing and homologous recombination in *Leishmania enriettii* using molecular genetic techniques.

The following faculty member has a secondary appointment at HSPH. His primary affiliation is with Harvard Medical School.

James H. Maguire, MD, MPH (Harvard University); Associate Professor in the Department of Tropical Public Health. Clinical features and epidemiology of parasitic diseases.



Summer Institute for Public Health Studies in Quantitative Methods

Session I: July 5-28, 1995
Session II: July 31-August 18, 1995

Director: Roberta Gianfortoni, MA, Director for Professional Training, Office of Professional Education

The Harvard Summer Institute for Public Health Studies in Quantitative Methods introduces students to the core quantitative disciplines of public health and helps them develop the ability to define, assess, and evaluate the health needs of populations, to participate in the development of health policy, and to assure the delivery of health services.

Students in the Summer Institute attend one or two three-week sessions in July and August. The 1995 curriculum includes the following courses: *Principles of Biostatistics* (parts I and II), *Principles of Epidemiology, Ethical Basis of Public Health,* and *Introduction to SAS.* Each course offers 2.5 credits, and the maximum recommended course load is 5 credits (two courses) per three-week session. Because the course work is very intensive and fast-paced, students registered for two courses in a session should not have other work commitments.

The Summer Institute is intended for health professionals in training or those who are considering a midcareer change into public health and feel the need to strengthen their skills in quantitative assessment, analysis, evaluation, and basic epidemiology. Participants include public health professionals, primary care practitioners, physicians engaged in the evaluation of health care delivery, physicians in training (including preventive medicine residents and medical students in an MD/MPH joint degree program), and candidates for a part-time MPH program. Students accepted for admission to an HSPH degree program may choose to begin their studies early by enrolling in the Summer Institute; these students will then have greater flexibility in course selection during the academic year. Other students may subsequently seek admission to an HSPH degree program.

Summer Program in Clinical Effectiveness
July 5-August 18, 1995

Co-directors: Howard H. Hiatt, MD, Professor of Medicine, Harvard Medical School; E. Francis Cook, SD, Associate Professor in the Department of Epidemiology, Harvard School of Public Health, and Associate Professor of Medicine, Harvard Medical School

The Program in Clinical Effectiveness, which is affiliated with Brigham and Women's Hospital, is intended for physicians who have completed their residencies and wish to obtain the quantitative and analytical skills needed for careers in clinical research. Candidates must be fellows or faculty members and must be sponsored by their clinical departments or divisions.

Students in this program attend an intensive seven-week, 15-credit summer program, comprising courses in biostatistics, epidemiology, and health policy and management. Upon completion of the summer program, qualified participants may apply these academic credits toward the requirements for either a Master of Public Health (MPH) or Master of Science (SM) degree. Two degree programs specifically designed for students in this field are the MPH with a concentration in Clinical Effectiveness (see page 8) and the SM in Epidemiology with a concentration in Clinical Epidemiology (see page 36). Qualified participants unable to attend class during the regular academic year may fulfill requirements for the SM in Clinical Epidemiology degree program by attending classes during a second or a third summer period and by completing a supervised research project.

English for Professional Education
August 21-September 1, 1995

The teaching style of American classrooms is highly interactive and requires proficiency in spoken English. Students are expected to ask questions in class and to respond quickly in classroom and group discussions.

A two-week course for non-native English-speaking students entering HSPH will be offered for four hours each day for two weeks. Students will practice their English language skills by listening to and discussing material with public health content. The course will focus on understanding rapidly spoken English, giving brief presentations, responding to questions, and offering a point of view in discussions.The course is particularly valuable for students who wish to strengthen their spoken English and to gain experience participating in small-group discussions. The tuition for the English for Professional Education Program is $700.

Advance Seminar Program
September 5-15, 1995

The Advance Seminar Program presents an opportunity for new international students and Master of Public Health (MPH) students to orient themselves to HSPH and to Boston. It provides a brief, intensive introduction to the academic aspects of study at the school, including beginning and intermediate computing, exercises in the discussion method of classroom learning, and a review of mathematical and writing skills.

Program participants learn about classroom protocol, expectations of teacher and student, and student life at the school. They have the chance to become familiar with, and settled in, the Boston area, and to become acquainted with fellow students in workshops and social gatherings.

The program is particularly valuable for those students who have not attended US colleges or universities and for those who have not recently been students. All international students are strongly advised to attend; US students entering the MPH program are welcome and encouraged to attend.

Office of Continuing Professional Education

Director: David A. Shore, MPA, PhD

To survive and thrive in today's health care environment, health professionals must possess core knowledge and skills and must be able to accept, encourage, and manage change. For more than a decade, the Office of Continuing Professional Education has sponsored senior-level programs to position its participants to do just that. Grounded in both research and practice, the continuing education program aims to educate professionals to assume positions of leadership in all fields of public health. The school interacts through this program with the

For more information about the Summer Institute for Public Health Studies in Quantitative Methods, please contact Hildi Keary, Administrative Assistant for Summer Programs, Registrar's and Admissions Offices, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1052
Fax: 617-432-2009
E-mail: admisofc@sph.harvard.edu
(specify Summer Institute on subject line)

For information about the Program in Clinical Effectiveness, or to request application materials, please contact E. Francis Cook, SD, Section for Clinical Epidemiology, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115.
Phone: 617-732-5650
Fax: 617-734-8347
E-mail: fran@clinepi.bwh.harvard.edu

For more information about the English for Professional Education Program or the Advance Seminar Program, please contact Roberta Gianfortoni, Director for Professional Training, Office of Professional Education, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0090
Fax: 617-432-3365
E-mail: rgianfor@hsphsun2.harvard.edu

For a brochure and a complete list of continuing education courses, please contact the Office of Continuing Professional Education, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1171
Fax: 617-432-1969
E-mail: contedu@sph.harvard.edu

professional community and, through the leaders it educates, plays an instrumental role in the development and immediate application of knowledge, theories, skills, techniques, and practices in public health.

Courses are presented by HSPH faculty members, in collaboration with other recognized leaders in the field. The case study method of instruction is used in many courses to facilitate fast-paced, interactive problem solving. Other courses include laboratory sessions and demonstrations with standard field equipment. Course participants are encouraged to share their own experiences with their colleagues and instructors, creating a dynamic learning environment.

To increase the value of these courses, continuing medical education credit and various other forms of continuing education credit for industrial and health care licensing and credentialing are provided. Each participant receives a certificate of attendance. The following is a partial list of continuing professional education courses offered during the 1995-96 academic year.

1995

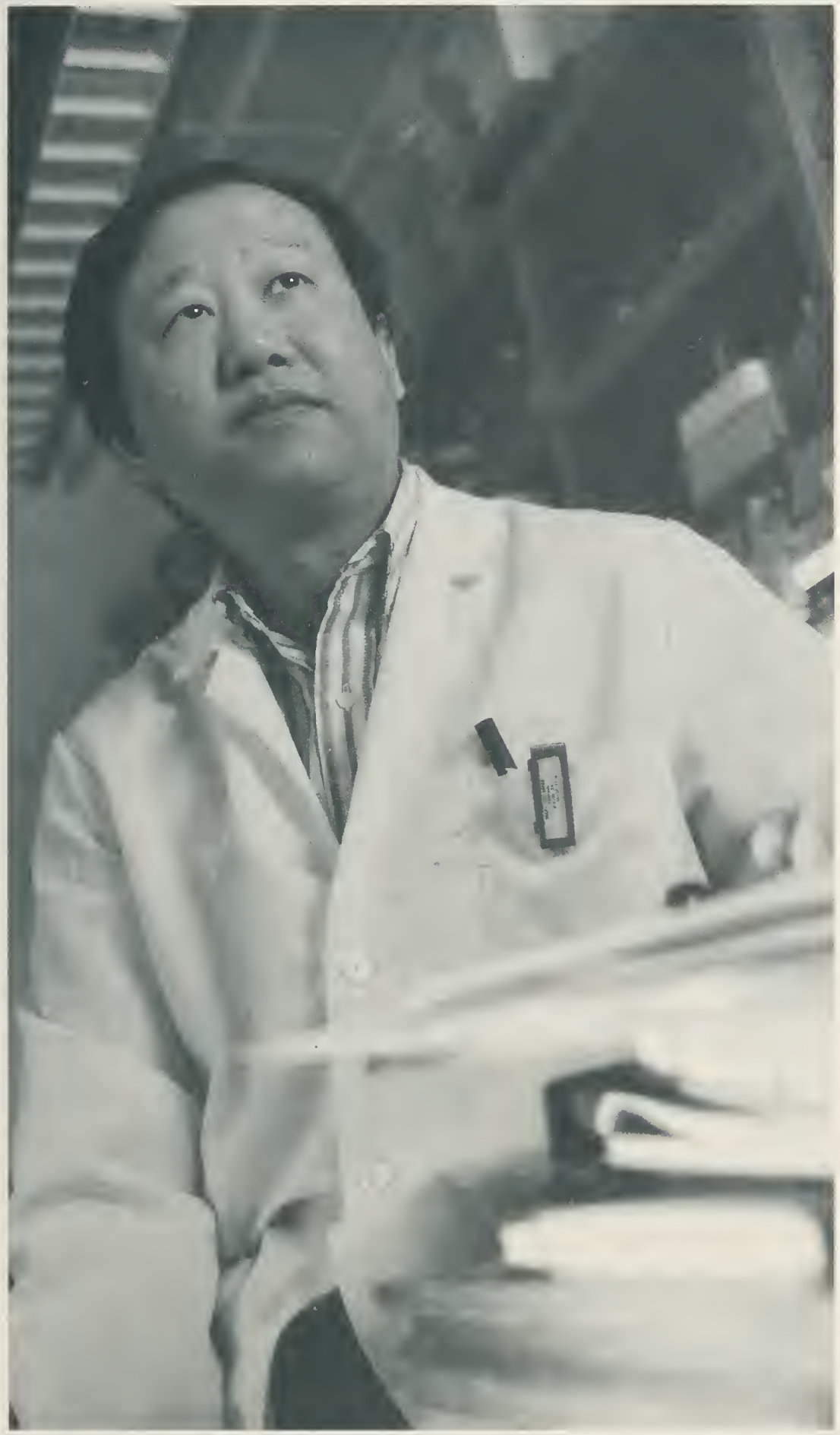
Aug 7-11	In-Place Filter Testing Workshop
Aug 14-18	Occupational and Environmental Radiation Protection
Aug 14-18	Current Issues in Nuclear Emergency Planning (*new version of Advanced Workshop on Nuclear Emergency Planning*)
Aug 21-24	Electric and Magnetic Field Health Research: State of the Science
Aug 24	Symposium on EMF Bioeffects: Linking Biophysics with Biology
Aug 21-25	Current Issues in Occupational and Environmental Radiation Protection (*new version of Advanced Workshop on Occupational and Environmental Radiation Protection*)
Sept 18-22	Industrial Ergonomics: Human Factors in Occupational Health and Safety
Sept 26-29	Analyzing Risk: Science, Assessment, and Management
Sept 29- Oct 1	Harvard Risk Management Series (Chicago)
Oct 16-20	Fundamentals of Industrial Hygiene
Oct 20-22	Harvard Risk Management Series (Boston)
Oct 23-27	Leadership in Evolving Healthcare Systems
Oct 30-Nov 1	Advances in Commercializing Biomedical Technologies
Nov 2	Negotiation and Conflict Resolution for Healthcare
Nov 6-9	Information Systems for Managed Care and Integrated Delivery Networks
Nov 13-17	Program for Implementation Strategies in Managed Care
Nov 17-19	Harvard Risk Management Series (Los Angeles)
Dec 4-7	Healthcare Information Systems Management
Dec 8-10	Harvard Risk Management Series (Boston)

1996

Jan 14-26	Program for Chiefs of Clinical Services
Jan 31	Negotiation and Conflict Resolution for Healthcare
Feb 4-9	Advanced Program for Chiefs of Clinical Services
Mar 4-8	Healthcare Management for Physicians in Community Hospitals
Mar 10-15	Advanced Program in Healthcare Negotiation and Conflict Resolution
Mar 17-23	Advanced Training in Biomedical Research Management
Mar 25-29	Occupational and Environmental Radiation Protection
Mar 25-29	Fundamentals of Industrial Hygiene
TBA	Human Rights and Health: A Program Designed Specifically for Health Professionals
Apr 9-12	Information Systems for Managed Care and Integrated Delivery Networks
Apr 15-19	Program for Executives in Managed Care
Apr 22-26	Guidelines for Laboratory Design: Health and Safety Considerations
Apr 29-May 3	Managing Ambulatory Healthcare: For Physicians in Community Health Centers
May 6-10	Program for Implementation Strategies in Managed Care
May 13-17	Environmental Radiation Surveillance
June 10-14	Management and Disposal of Radioactive Waste
June-Aug (TBA)	Managing Health Programs in Developing Countries
June 17-21	Testing and Certification of Biological Safety Cabinets
June 17-21	Planning for Nuclear Emergencies
June 24-26	Atmospheric Science and Radioactivity Releases

RESEARCH CENTERS

The school has established several centers to advance research in areas of importance to health, such as injury control, population studies, and prevention of cardiovascular disease. These centers tend to be multidisciplinary in their approach, bringing together faculty from several HSPH departments and, in some instances, from several Harvard schools. Faculty affiliated with the centers offer courses in their field of interest through the school's academic departments and often provide opportunities for student involvement in research.



Center for Cancer Prevention

Director: Dimitrios V. Trichopoulos, MD, Vincent L. Gregory Professor of Cancer Prevention and Professor of Epidemiology

HSPH has been a leader in many facets of cancer research, including identification of dietary, occupational, smoking, hormonal, and viral exposures in cancer occurrence. In 1993, the Center for Cancer Prevention was founded to promote prevention by creating an interdisciplinary collaboration among its cadre of biologists, epidemiologists, behavioral scientists, and policy analysts. The goals of the center are to develop innovative research objectives to increase the likelihood of important advances in knowledge of cancer causation, effective methods of prevention, and application in design of education and intervention efforts; to train the next generation of leaders in cancer prevention; and to become a leading authority on cancer prevention and to inform efficacious interventions for the scientific and medical communities, media, policy makers, and the general public.

Current programs of the center include an annual cancer prevention update symposium, bimonthly newsletter, pilot project grant program, monthly speaker series, spring visiting lectureship, and an expanding program of workshops and working groups. New courses are being developed to bridge interdisciplinary elements of cancer prevention.

Affiliated with the Center for Prevention of Cardiovascular Disease, Assistant Professor Mu-En Lee has discovered how the amino acid homocysteine promotes clogging of coronary arteries.

For more information about the Center for Cancer Prevention, contact David J. Hunter, MB, BS, SD, Executive Director, Center for Cancer Prevention, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2755
Fax: 617-432-0335
E-mail: nhdjh@gauss.med.harvard.edu

For more information about the Center for Health Communication, contact Terri Mendoza, SM, RD, Director of Health Information, Center for Health Communication, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1038
Fax: 617-731-8184
E-mail: tmendoza@sph.harvard.edu

For more information about the Center for Quality of Care Research and Education, contact R. Heather Palmer, MB, BCh, SM, Director, Center for Quality of Care Research and Education, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-0779
Fax: 617-432-3199

For more information about the Center for Risk Analysis, contact Mary Esther Otts, Administrator, Center for Risk Analysis, 718 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4497
Fax: 617-432-0190
E-mail: motts@sph.harvard.edu

Center for Health Communication

Director: Jay A. Winsten, PhD, Associate Dean for Public and Community Affairs

A key challenge facing health professionals is to mobilize the power of mass communication to empower individuals to adopt healthy behaviors, to direct policy makers' attention to important health issues, and to frame those issues for public debate and resolution. To address this challenge, the Center for Health Communication has pioneered a new field of endeavor—mass communication and public health—by researching and analyzing the contributions of mass communication to behavior change and policy, by helping to prepare future health leaders to utilize effective communication strategies, and by strengthening communication between journalists and health professionals.

The center's best-known initiative, the Harvard Alcohol Project, demonstrated how a new social concept—the designated driver—could be rapidly introduced through mass communication, promoting a new social norm that the driver does not drink. The project represents the first large-scale effort to incorporate health messages within the dialogue of Hollywood scripts. A second major effort, the "Squash It!" Campaign to Prevent Youth Violence, seeks to reinforce and validate decisions by young people to disengage from potentially violent confrontations.

Other center initiatives involve exploring the relationship between science, technology, and the media; working with magazine writers and editors on nutrition and other health issues; and researching the use of cause-related marketing strategies for health promotion.

Center for Quality of Care Research and Education (QCRE)

Director: R. Heather Palmer, MB, BCh, SM, Lecturer on Health Services

While health care policy has, in recent years, been dominated by issues of cost containment and access to care, it is widely recognized that cost and access cannot be adequately addressed without also dealing with the issue of quality of care. QCRE conducts research on quality of care and sponsors a weekly research seminar series. Faculty affiliated with QCRE teach in the Department of Health Policy and Management, promote doctoral and postdoctoral research on quality of care, and work to establish partnerships with health care institutions and agencies involved in the measurement and improvement of health care quality.

QCRE's research concerns measurement of clinical quality of care in order to compare health care organizations and health care plans, and the use of such comparisons to stimulate internal quality improvement. Recent projects for the Agency for Health Care Policy Research and the Health Care Financing Administration involved review of care in managed care settings using administrative databases, medical records, and patient surveys. QCRE also developed methods to translate practice guidelines into review criteria, performance measures, and standards of quality for use in guideline dissemination and quality improvement.

Center for Risk Analysis

Director: John D. Graham, PhD, Professor of Policy and Decision Sciences

The mission of the Harvard Center for Risk Analysis is to foster a reasoned public response to health, safety, and environmental hazards. Major problem areas include consumer and worker exposures to toxic chemicals, risks and benefits of pharmaceuticals and medical devices, community exposures to air and water pollution, electric and magnetic fields, food safety, accidents and violence, and indoor exposures to lead, asbestos, and radon. Current center research focuses on toxics use reduction, Superfund, lifesaving interventions, distributional methods in risk assessment, environmental justice, and the greening of industry.

The center defines "risk analysis" broadly to include the interrelated tasks of risk assessment, risk evaluation, risk management, and risk communication. Major center activities include methodological research, curriculum development, the facilitation of risk communication, and public policy analysis. Many of these activities are conducted collaboratively with professionals from business, labor, government agencies, and public-interest groups.

The center sponsors a monthly seminar series that draws faculty, students, and practitioners together to discuss current issues in risk analy-

sis. The center provides a stimulating environment for doctoral research. Finally, the center offers students internship and employment opportunities and, where appropriate, links students with prospective employers.

Center for Prevention of Cardiovascular Disease

Director: Edgar Haber, MD, Elkan R. Blout Professor of Biological Sciences

The Center for Prevention of Cardiovascular Disease was established to foster multi-disciplinary research and training in cardiovascular disease and its prevention. Progress in cardiovascular disease prevention is optimally promoted by the close interaction of epidemiologists and laboratory scientists, where laboratory discoveries and epidemiological observations interact in an iterative manner to advance research in both fields. Basic biological and epidemiological discoveries must be placed in a wide social context, for experience has shown that the impact of a preventive measure, once discovered, is blunted if it is not widely applied. Thus, a long-term goal of the center is to establish research teams that investigate the biological and behavioral contributors to heart disease and suggest health policy measures that support its prevention.

Students may pursue a thesis in the Cardiovascular Biology Laboratory that focuses on the molecular and cellular events leading to arterial occlusion, utilizing advanced techniques in molecular and cellular biology. Students interested in cardiovascular biology should contact Dr. Haber; in cardiovascular epidemiology, Dr. Walter Willett; or in social behavior, Dr. Ichiro Kawachi.

Members of the HSPH faculty whose primary affiliation is with the Center for Prevention of Cardiovascular Disease are as follows:

Edgar Haber, MD (Columbia University); Elkan R. Blout Professor of Biological Sciences; Professor of Medicine, Harvard Medical School. Identification of novel genes expressed in cells that contribute to the arteriosclerotic process with the goal of finding interventions that are unique to the arterial wall.

(Arthur) Mu En Lee, BM (Kaohsiung Medical College), PhD (University of California, San Francisco); Assistant Professor of Molecular Biology. Transcriptional regulation of genes expressed in the blood vessel wall in normal and diseased states.

Guy L. Reed III, MS, MD (Stanford University); Assistant Professor of Immunology. Analysis of platelet activation and cellular interactions by molecular cloning, biochemical, and histological techniques.

Mary E. Russell, MD (University of Health Sciences, Chicago Medical School); Assistant Professor of Cardiovascular Biology. Monocyte/macrophage activation; cellular adhesion and migration; arteriosclerosis.

Educational Resource Center for Occupational Safety and Health

Director: Richard R. Monson, MD, SD, Professor of Epidemiology

The primary objective of the Educational Resource Center is to give occupational safety and health professionals the opportunity to develop public health perspectives, a sensitivity about political climates, and the skills and knowledge needed to identify and prevent occupational impairments, disease, and injuries through control or elimination of harmful occupational exposures. Descriptions of the degree programs and of the occupational and environmental medicine residency are included with the description of the Department of Environmental Health (page 28).

The center is partially supported by a grant from the National Institute for Occupational Safety and Health (NIOSH). Qualified individuals undertaking an approved degree program in occupational medicine, industrial hygiene, occupational health nursing, or hazardous substance training may be eligible for traineeship awards that fund tuition and health fees.

Other facets of the center include a sponsored research program spanning a variety of occupational health problems and drawing upon the expertise of scientists in many disciplines. The center also offers short-term courses, seminars, and workshops. Finally, through its outreach program, the center has formed a network that encompasses academic institutions, professional societies, governmental agencies, unions, companies, and community associations throughout the New England region.

For more information about the Center for Prevention of Cardiovascular Disease, contact Mary H. Mitchell, Assistant Director, Center for Prevention of Cardiovascular Disease, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2950
Fax: 617-432-2980
E-mail: mitchell@cvlab.harvard.edu

For more information about the Educational Resource Center for Occupational Safety and Health, contact Daryl Bichel, Assistant Director, Educational Resource Center, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-3314
Fax: 617-432-0219
E-mail: dbichel@sph.harvard.edu

The new François-Xavier Bagnoud Building, scheduled for completion in the fall of 1996, will house the FXB Center for Health and Human Rights, as well as laboratory and classroom space.

For more information about the François-Xavier Bagnoud Center for Health and Human Rights, contact center staff at 8 Story Street, Cambridge, MA 02138.
Phone: 617-496-4370
Fax: 617-496-4380
E-mail: fxbcen@harvarda.harvard.edu

For more information about the Harvard AIDS Institute, contact Richard Marlink, MD, Executive Director, Harvard AIDS Institute, 8 Story Street, Cambridge, MA 02138.
Phone: 617-495-0478
Fax: 617-495-2863

For more information about the Harvard Center for Population and Development Studies, contact Winifred M. Fitzgerald, Assistant Director, Harvard Center for Population and Development Studies, 9 Bow Street, Cambridge, MA 02138.
Phone: 617-495-3002
Fax: 617-495-5418

François-Xavier Bagnoud Center for Health and Human Rights

Director: Jonathan M. Mann, MD, MPH, François-Xavier Bagnoud Professor of Health and Human Rights and Professor of Epidemiology and International Health

Human rights violations cause great harm to health. The François-Xavier Bagnoud Center for Health and Human Rights considers the promotion and protection of health and the promotion and protection of human rights to be inextricably linked. Through research, teaching, and service activities, the center explores the conceptual and practical dimensions of this critical relationship. The center works at the local, national, and international level, through collaboration with organizations, agencies, and institutions involved in both health and human rights.

As the first academic institute to focus exclusively on health and human rights, the center is engaged in pioneering work. Activities include developing and catalyzing research; expanding "literacy" on health and human rights through educational programs, including conferences, courses, seminars, and speaker series; publication of a new international journal; sponsorship of a fellowship program; and collaborating on research and advocacy work with field organizations. Children's health and rights receive particular attention.

The International AIDS Program and the Global AIDS Policy Coalition, housed at the center, bring scientists, activists, and providers together to provide independent evaluation and policy analysis of the global HIV/AIDS pandemic. The coalition's 1992 report, *AIDS in the World,* was published by Harvard University Press; a second edition is scheduled for late 1995.

Harvard AIDS Institute

Chair: Myron E. (Max) Essex, DVM, PhD, Mary Woodard Lasker Professor of Health Sciences

The Harvard AIDS Institute was established as a response to the social and medical challenges of the AIDS pandemic. The institute facilitates communication and collaboration among researchers at Harvard University and beyond to fulfill its principal goals: To promote research that enhances understanding of HIV prevention, transmission, diagnosis, and treatment; to advance AIDS education on local, national, and international levels; to provide multidisciplinary AIDS training to scientists and clinicians throughout the world; and to stimulate the development of policies and solutions that benefit those affected by the HIV epidemic.

A full range of AIDS research, from biological to behavioral, is under way at the university, and the institute has launched a number of programs to complement this research. The institute sponsors numerous national and international conferences, strategic symposia, and forums on issues in AIDS research, policy, and clinical care. Through the Fogarty International Training Program in AIDS-Related Epidemiology, the institute trains biomedical researchers and health care workers from developing countries in basic laboratory and epidemiologic research techniques. The institute also trains US medical students and postdoctoral fellows, disseminates information about advances in AIDS research through a variety of publications and films, and funds innovative research at Harvard through its Research Initiatives Fund.

Harvard Center for Population and Development Studies

Director: Lincoln C. Chen, MD, Taro Takemi Professor of International Health

The Harvard Center for Population and Development Studies aims to advance understanding of world population issues through collaborative research, publications, and seminars. Through the MacArthur Program in Population and Development, the center sponsors the David E. Bell Fellowships, which support the development of young leaders by strengthening their analytical and research skills, increasing managerial and decision-making competence, and enhancing ethical sensitivities needed for careers in population and development.

The center has research working groups focusing on several themes: *Health, Population, and Development,* a program with the goal of strengthening social science contributions to the understanding of the dynamics of health, mortality, and fertility changes around the world; *Human Security,* an exploration of new concepts of security through research initiatives that focus on ethics and international policy, human survival crises during complex humanitarian emergencies, environmental security and new diseases, and population and security; *Burden of Disease,* a program that pursues research and training for burden of disease studies, analysis of the cost-effectiveness of health interventions, and health sector resource allocation choices; and *Gender and Population Policy,* a research program that integrates gender equity into population policies, to ensure accountability and transparency of policy actions, to improve the safety, efficacy, and social appropriateness of old and new technologies, and to enhance the performance of reproductive health programs.

Harvard Injury Control Center

Director: John D. Graham, PhD, Professor of Policy and Decision Sciences

Injury in America persists as the leading killer of children and young adults, and has an estimated cost to society of $158 billion per year. The Harvard Injury Control Center promotes the prevention and treatment of trauma through scientific research, policy analysis, training, and communications. Prevention, emergency and acute care, and rehabilitation are all essential components of injury control, and research efforts encompass unintentional injuries as well as violence such as suicide, assault, and child or spouse abuse. Current research priorities include motor vehicle crash injuries, violence prevention, and trauma systems development.

The center sponsors two injury control courses at HSPH and organizes seminars on contemporary issues. The field of injury control offers challenging research opportunities and a myriad of timely thesis topics for public health students.

The center works with experts at Harvard Medical School, Boston University School of Public Health, New England Medical Center, and the Educational Development Center, Inc., to achieve its goals. The center also collaborates with the Massachusetts Department of Public Health and other government agencies.

For more information about the Harvard Injury Control Center, contact Mary Esther Otts, Administrator, Harvard Injury Control Center, 718 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-4497
Fax: 617-432-0190
E-mail: motts@sph.harvard.edu

Kresge Center for Environmental Health

Director: John B. Little, MD, James Stevens Simmons Professor of Radiobiology

The Kresge Center serves as a focal point for environmental health-related research and educational activities at HSPH. Full-time faculty within the center include physicians, engineers, physiologists, biologists, toxicologists, chemists, mathematicians, and physicists. This diversity enables the staff to deal effectively with environmental and occupational health problems that require a multidisciplinary approach.

The center conducts research and training in the following areas: occupational health and safety, air pollution health effects and control, biochemical toxicology, radiation biology and radiological health (radiation protection), respiratory biology (inhalation toxicology), and environmental health engineering and management. Students interested in pursuing degree programs in these areas should enroll in the relevant HSPH department. Students interested in hazardous waste, water quality, and water resources may also apply to degree programs in Harvard's Graduate School of Arts and Sciences.

For more information about the Kresge Center for Environmental Health, contact John B. Little, MD, Director, Kresge Center for Environmental Health, 665 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1184
Fax: 617-432-0107

APPLYING TO THE SCHOOL: ADMISSION, FINANCIAL ASSISTANCE, AND HOUSING

Admission to Degree Programs

The admissions information in this section pertains to applications for degree programs offered by the Harvard School of Public Health. These are the Master of Public Health (MPH), Master of Occupational Health (MOH), Master of Science (SM), Doctor of Public Health (DPH), and Doctor of Science (SD) degrees.

The PhD programs described in this *Register* are offered under the auspices of the Graduate School of Arts and Sciences (GSAS). Please note that GSAS application forms and procedures are different from those used by applicants to programs administered by HSPH. The GSAS application deadlines are December 15, 1995, for programs in the natural sciences and December 29, 1995, for all other programs. For information about admission to the Biological Sciences in Public Health Program, please contact the Division of Medical Sciences, Harvard Medical School, 260 Longwood Avenue, Room 435, Boston, MA 02115 (phone: 617-432-0162). For information about admission to the PhD Program in Health Policy, please contact Joan P. Curhan, Director, 79 John F. Kennedy Street, Cambridge, MA 02138 (phone: 617-496-5412). (See page 10 for further information about PhD programs in the biological sciences and page 51 for information about the PhD in health policy.)

Application Deadline Applications for all HSPH doctoral (SD and DPH) and Master of Science (SM) programs must be complete by January 2, 1996.

All complete applications for the MPH and MOH programs that are received on or before January 2, 1996, will be considered in a priority admission cycle. The final deadline for completing applications to MPH and MOH programs for review in a second cycle is February 28, 1996. It is to the candidate's advantage to meet the priority deadline, as departments and degree programs may fill to capacity during the priority admission cycle. Applications that arrive after February 28, 1996, and those that remain incomplete as of that date, will not be considered for admission for the 1996-97 academic year.

Clinical Effectiveness and Summer Institute affiliates matriculating in the 1995 summer program who wish to apply for degree candidacy must do so by September 1, 1995.

Application Procedures and Requirements
Only complete applications will be processed and reviewed for admission. For an application to be considered complete, the Admissions Office must receive the following application materials by the deadline indicated above:

- A completed and signed *application form*, self-addressed *mailing labels*, and a 500-word *essay* written by the applicant. This essay should describe the applicant's academic and professional history, area of interest at HSPH, reasons for wanting to enroll in the degree program, and professional or academic career plans upon completion of the program.

- *Official transcripts* from all colleges, graduate schools, and/or professional schools attended, whether or not the courses taken appear to be relevant to a degree in public health. Transcripts should list courses taken, grades received, and degree(s) conferred (if applicable). To be considered official, a transcript must be received by the Admissions Office in an envelope sealed and signed by the registrar of the school issuing the transcript. Applicants are expected to have a distinguished undergraduate record, as well as excellent performance in any graduate work undertaken.

- *Letters of recommendation* from at least three people who are well acquainted with the applicant's academic work and/or professional experience. (Recommendation forms are provided in the application packet.)

- *Official scores of the Graduate Record Examination* (GRE). Since applications will not be considered without test score reports, applicants should take the GRE no later than October. Official scores from the following tests may be substituted by applicants who are currently working toward or who have earned postbaccalaureate degrees in medicine, dental medicine, management, or law, respectively: Medical College Admission Test (MCAT), Dental Admission Test (DAT), Graduate Management Admission Test (GMAT), or Law School Admission Test (LSAT). Strong test scores, especially on the quantitative portion of the test, are important. The requirement for scores from a standardized test may not be waived on the basis of academic or professional background.

- *Official scores of the Test of English as a Foreign Language* (TOEFL), if applicable. Applicants (including those who have been US citizens or US permanent residents for less than one year) from countries where English is not the language of instruction must submit a score from the TOEFL. Applicants are advised to take the TOEFL no later than November; those who have already taken the TOEFL may submit the score as long as it is not more than two years old. While a minimum score of 550 is required for admission to a degree program, preference is given to doctoral applicants with scores closer to 600, due to the demanding nature of the program. In rare circumstances, an applicant may be admitted to special student status with a TOEFL score of 547 to 549. Subsequent admission to degree candidacy, if desired, is contingent upon the applicant's retaking the TOEFL and receiving a minimum score of 550. These students may be required to complete an English course before attending courses at HSPH.

- A non-refundable *application fee* of US $60 in the form of a check drawn on a bank in the United States, a postal money order, or an international money order payable to the Harvard School of Public Health.

An applicant may apply to only one degree program (MPH, MOH, SM, SD, or DPH). An applicant who wishes to apply for a joint degree in two departments should submit a petition requesting consideration by both departments. Requirements for admission to both departments must be satisfied. Applicants to degree programs may apply for either full-time or part-time status; international students are eligible for full-time study only. Admission is granted for the fall semester of a particular year (currently September 1996). Students who are unable to enroll at that time may request a deferral and may be required to reapply. Applicants who require an early decision may apply during the admission period for the year before the one

Please refer to the instruction booklet that accompanies the application forms for detailed procedures and requirements. Prospective students who wish to request application materials, who have questions about admission requirements, who require assistance with the application process, or who wish to visit the school should contact Carrie Daniels, Assistant Director of Admissions, HSPH Admissions Office, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1031
Fax: 617-432-2009
E-mail: admisofc@sph.harvard.edu

Housing

The Henry Lee Shattuck International House is operated by the school on a nonprofit basis for its full-time students and their families from the United States and abroad. Located within walking distance of the school, Shattuck International House has 72 apartments in a range of sizes to accommodate single students, roommates, and families. Each apartment is furnished and has its own kitchenette and bath. Shared facilities include a laundry room, study/function room, computer room, TV room (equipped with VCR), library, music room (with piano), exercise room (with cross country ski simulator, exercise bicycle, and ping-pong table), children's playroom, and outside recreation area (with barbecue grill, basketball hoop, volleyball court, swing set, and slide). The four-story building is not equipped with an elevator.

Because the demand for apartments far exceeds their availability, applications for Shattuck International House should be submitted as early as possible. Applicants to the school may submit a housing application before receiving notification of admission. However, apartments are not assigned until applicants are admitted and have confirmed their intention to enroll. If an applicant is denied admission to the school, the application for housing will be withdrawn. Applications received by May 1 will receive priority consideration; applications received after that date will be considered until all units are filled.

International students may live in Shattuck International House a maximum of three years, and US and Canadian students may stay a maximum of two years, assuming they continue to be full-time students. Each year, seventy percent of the available apartments are assigned to international students and thirty percent to US and Canadian students. The distance of a student's home from Boston is the determining factor in the assignment of apartments.

Tuition and Fees, July 1995-June 1996

Tuition for full-time master's degree students and special students		
(20-credit minimum and 25-credit maximum per semester, fall and spring)	$ 18,840	per year
Tuition for part-time master's degree students, special students, and affiliates		
(1-19 credits per semester, fall and spring, with a maximum of 15 summer credits)	$ 471	per credit
Tuition for full-time resident doctoral students		
(20-credit minimum and 25-credit maximum per semester, fall and spring)		
Full-time, year 1	$ 18,840	per year
Full-time, year 2	$ 18,840	per year
Full-time reduced, year 3	$ 9,420	per year
Facilities fee, year 4 to thesis defense	$ 2,400	per year
Thesis defense fee (final semester before graduation)	$ 1,000	one semester
Tuition for part-time resident doctoral students		
Credits 1-80	$ 471	per credit
Credits 81-120	$ 236	per credit
Credits 121 to thesis defense	$ 60	per credit
Thesis defense fee (final semester before graduation)	$ 1,000	one semester
Tuition for nonresident doctoral students, full-time or part-time	$ 1,251	per year
Tuition for summer session 1995	$ 471	per credit
Fees		
Registration fee (summer, fall, spring)	$ 125	per semester
Late registration fee	$ 75	per week
Late add/drop/change fee	$ 75	per petition
Leave of absence fee	$ 250	per semester
Health fees (see page 89)		

Note: Tuition rates are given in 1995-96 tuition dollars. Continuing students should expect an increase of 5-9% each year.

in which they wish to enroll (for example, they may apply during the winter of 1995-96 for admission in September 1997).

Application Review Applicants are notified in writing of their application status soon after the application is received. If the application is incomplete, the applicant is informed of the items still outstanding. Applications complete by January 2, 1996, will be considered during the priority admissions cycle. Applications to MPH and MOH programs and for special student status that become complete after January 2 will be held for review in a second group. The applicant is notified in writing as soon as a decision is made. The decision of the Committee on Admissions and Degrees is final and is not subject to appeal.

It is the policy of HSPH to make admission decisions on the basis of an individual's qualifications for the program to which he or she has applied. HSPH does not discriminate against individuals on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or disability.

Health Fees, July 1995-June 1996

University Health Services (UHS) Fee	Semester	Year
Individual	$ 317	$ 634
Family (student plus spouse)	634	1,268
Family (student plus spouse and one child)	810	1,619

The University Health Services (UHS) provide comprehensive prepaid medical care such as physical examinations, physician visits, laboratory tests, psychological counseling, and emergency services. The UHS fee is compulsory for all degree candidates and special students registered for 10 or more credits in a semester. Others may elect to waive UHS coverage; this must be done before the first day of fall registration.

Blue Cross/Blue Shield (BC/BS) Medical Insurance		
Individual	$ 283	$ 566
Family (student plus spouse)	841	1,681
Family (student plus spouse and one child)	1,264	2,528

The Blue Cross/Blue Shield (BC/BS) plan provides extensive benefits for ambulatory and inpatient care not offered at UHS. BC/BS coverage is compulsory for all nonimmigrant international students and for all other students who do not have comparable insurance. International students whose spouse and/or children will also be living in the US are required to enroll in the family plan. US students who have comparable insurance may elect to waive BC/BS coverage; this must be done before the first day of fall registration.

Note: UHS and BC/BS coverage extends from September 1 through August 31. For more information, please contact the Student Insurance Office, Harvard University Health Services, 75 Mt. Auburn Street, Cambridge, MA 02138 (phone: 617-495-2008; fax: 617-496-6125).

Tuition Deposit and Financial Certification Applicants who are granted admission must submit a $500 tuition deposit when confirming acceptance of the offer of admission. This deposit is nonrefundable and will be applied toward the student's tuition and fees.

Accepted applicants who are not US citizens or permanent residents must demonstrate that sufficient funds are available in US currency to pay the costs (tuition, fees, living expenses, and costs associated with the English for Professional Education Program, if applicable) of the full period of their academic program. A financial certification form is included in the admission packet for this purpose and must be completed before the immigration form (I-20 or IAP-66) needed to obtain a visa can be issued. In addition, international students supported by personal funds, family funds, or sponsors' funds which are not paid directly to Harvard University are required to deposit, in a Boston-area bank in an account bearing their name, funds adequate to cover the appropriate tuition, fees, and living expenses for the degree program. An official letter stating the amount held in US dollars must be sent directly by the bank to the Admissions Office for each account before the immigration forms can be completed. Students bringing their families to the US must transfer and certify adequate funds for their support as well. (Please see page 90 for an estimate of living expenses in the Boston area.)

Admission to Nondegree Status

Affiliates Harvard faculty and staff, employees of Harvard hospitals, HSPH alumni, and certain other Boston-area public health professionals may register for up to ten credits per semester as nondegree *affiliates* of the school. Affiliates must register in person at the HSPH Registrar's Office during the week before the course begins; please call the Registrar's Office at 617-432-1032 to learn the exact dates for affiliate registration.

Housing

Applicants visiting HSPH may meet with Carol O'Connell, Graduate Services Coordinator, to discuss housing options or may wish to consult the apartment listings located in the Office of Student Affairs and Residential Life. Printed information about seeking and renting apartments in Boston is available upon request.

For information about housing and to request application forms for Shattuck International House, please return the postcard inside the back cover of this *Register,* or contact Carol O'Connell, Graduate Services Coordinator, HSPH Office of Student Affairs and Residential Life, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1034
Fax: 617-432-3184
E-mail: coconnell@sph.harvard.edu

Estimated Student Expense Budgets, 1995-96

	US Citizens/ Permanent Residents		Non-US Citizens		US Citizens/ Permanent Residents		Non-US Citizens		US Citizens/ Permanent Residents		Non-US Citizens	
	Individual 9 Mos.	Individual 12 Mos.	Individual 9 Mos.	Individual 12 Mos.	Family of 2 9 Mos.	Family of 2 12 Mos.	Family of 2 9 Mos.	Family of 2 12 Mos.	Family of 3 9 Mos.	Family of 3 12 Mos.	Family of 3 9 Mos.	Family of 3 12 Mos.
Full-time resident tuition	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840	$18,840
UHS fee	634	634	634	634	1,268	1,268	1,268	1,268	1,619	1,619	1,619	1,619
BC/BS insurance	566	566	566	566	1,681	1,681	1,681	1,681	2,528	2,528	2,528	2,528
Registration fee	250	250	250	250	250	250	250	250	250	250	250	250
Books/supplies	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175
Loan fees	800	800	N/A	N/A	800	800	N/A	N/A	800	800	N/A	N/A
Rent/utilities	7,140	9,520	7,140	9,520	7,854	10,472	7,854	10,472	8,470	11,293	8,470	11,293
Food	2,350	3,130	2,350	3,130	3,572	4,763	3,572	4,763	4,286	5,715	4,286	5,715
Personal	2,550	3,400	2,550	3,400	3,672	4,896	3,672	4,896	4,080	5,440	4,080	5,440
Local transportation	445	585	445	585	883	1,175	883	1,175	1,122	1,495	1,122	1,495
Total	$34,750	$38,900	$33,950	$38,100	$39,995	$45,320	$39,195	$44,520	$43,170	$49,155	$42,370	$48,355

For information about admission to affiliate status, please contact the HSPH Registrar's Office, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1032
Fax: 617-432-2009
E-mail: manthony@sph.harvard.edu

For information about admission to special student status, please contact Carrie Daniels, Assistant Director of Admissions, HSPH Admissions Office, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1031
Fax: 617-432-2009
E-mail: admisofc@sph.harvard.edu

Enrollment of affiliate students in specific courses is subject to the availability of space and the permission of the instructor and the registrar; if classes fill to capacity, preference is given to HSPH degree candidates. Payment is on a per-credit basis and is due at the time of registration. Payment is not refundable unless the student is unable to take the desired course because it is already filled to capacity. Affiliate students may not cross-register into other Harvard schools or MIT, nor may they audit courses.

Special Students Individuals who do not fall into one of the categories listed above may apply for *special student* status. Applicants for special student status are subject to the same admission and registration requirements and procedures as are applicants for degree candidacy. US citizens and permanent residents may apply to the Admissions Office for full-time or part-time special student status. Foreign applicants are eligible for full-time status only. Admission to special student status is limited to one academic year.

Subsequent Application for Degree Candidacy Affiliates and special students who wish to be admitted to degree candidacy must reapply and will be considered on the same basis as other applicants for admission. Applicants to degree programs who have taken courses at the school within the preceding three years may, at the time of their application, petition to count up to twenty credits retroactively as part of the academic credit requirements. Permission may be granted if the courses fit into the applicant's academic degree program. (Applicants who have taken HSPH courses within the past three years while enrolled at another Harvard school or at MIT may petition to count up to twenty credits toward their HSPH degree only if the courses taken did not count toward another degree. The applicant must submit, at the time of his or her application, an official transcript from the other school, as well as a letter from that school's registrar stating that the courses taken at HSPH have not been counted toward another degree.)

Financial Assistance

The table above provides estimates of the cost of spending a year at HSPH and should be used as a guide in planning finances. While academic departments and the Financial Assistance Office make every effort to help students find ways to finance their education at HSPH, the school does not have need-based grants, and resources for student financial assistance are extremely limited. Applicants are urged to investigate all potential sources of support, including employers, government agencies, and civic and religious organizations. The Financial Assistance Office has prepared a *Directory of Sources of Funding Outside HSPH*, which is available upon request.

Limited financial assistance is available in the form of grants, loans, and work programs, as follows:

Grants. Some departments have training grants that provide funds up to full tuition plus stipend. Eligibility for training grants is generally based on career goals, academic merit, experience, and US citizenship or permanent residency. Other grants also may be available, eligibility for which varies according to departmental goals and priorities. All incoming students, including international students, are considered for these funds, and no separate application need be submitted.

Federal Student Loans. The Financial Assistance Office administers several federal Title IV student loan programs. US citizens and permanent residents may be eligible to borrow up to $18,500 of Federal Direct Student Loans if they meet the registration status requirements, submit the required financial documentation, have no prior federal student aid loans in default, and do not owe refunds on other federal student aid. Perkins Loans of up to $5,000 may be available to a limited number of students demonstrating extreme financial need.

Work Programs. Some students are able to secure part-time employment as research or teaching assistants in their academic departments. The school also participates in the Federal Work-Study Program, which assists US citizens and permanent residents by covering 60% of their earnings. FWSP eligibility is based on financial need, other financial aid received, and availability of funds. FWSP funds are generally used during the summer and are offered to students entering their second year at the school.

To be considered for federal loans and work-study, students must submit the following documents to the Financial Assistance Office:

- Completed and processed ***Free Application for Federal Student Aid (FAFSA) for 1996-97.*** The toll-free number to request the FAFSA is 1-800-433-3243; the toll-free number for the hearing impaired is 1-800-730-8913. Allow 4-6 weeks processing time.

- Completed ***HSPH Request for Federal Assistance Form for 1996-97.*** This form should be submitted to the Financial Aid Office by February 16, 1996.
- Signed copy of the applicant's ***1995 Federal Income Tax Return***, with schedules, or a Non-Filer Statement.
- ***Financial aid transcripts*** from all previously attended colleges and universities (even if no aid was received from that school).
- For permanent residents, a copy of the front and back of the ***Alien Registration Card.***
- For permanent resident males born after January 1, 1960, who are not registered with Selective Service, ***a statement from Selective Service*** indicating that they did not willfully fail to register. This statement can be obtained by writing to the Selective Service System, Office of the General Counsel, Washington, DC 20435.

Staff in the Financial Assistance Office review completed financial assistance applications as soon as they have been notified by the Admissions Office that the applicant has been admitted to the school and they have confirmed any departmental grant offers. A loan package letter is sent to the applicant within one week of that date.

In decisions about financial assistance, HSPH does not discriminate against individuals on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or disability.

Please refer to the instruction booklet that accompanies the financial assistance application forms for additional information about loan and work programs. Information about financial assistance can also be accessed through GOPHER. Applicants with questions should contact the HSPH Financial Assistance Office, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1867
E-mail: hsphfao@sph.harvard.edu

ENROLLMENT AND STUDENT SERVICES

Registration

Prior to registration, students receive complete course descriptions and information about course meeting times and registration procedures. Every resident degree candidate is expected to register in person on the dates specified. The fall registration dates for 1995 are September 5 for participants in the Advance Seminar Program, September 8 for other new students, and September 9 for returning students. A student who is unable to register at the designated time should write to the Registrar's Office to request late registration or will be assessed a late registration fee of $75 per week. Students who intend to cross-register for courses in other Harvard schools or at MIT should be aware that registration deadlines and academic calendars vary from school to school and that they must conform to the registration requirements of the school into which they are cross-registering as well as those of HSPH.

In order to register, students must show that they have met any contingencies stated in their letter of admission, that they have complied with the Massachusetts state regulation concerning immunization against measles, mumps, and rubella, and, for international students, that they have presented their passports and entry permits to the Harvard International Office. In order to remain registered, students must take appropriate action to pay their semester term bill by the due date of the bill on which the charges appear. Information about each of these prerequisites is sent to incoming students prior to their arrival at the school.

Degree candidates are subject to certain course load and tuition requirements. All degree candidates (with the exception of nonresident doctoral students and students on leave of absence) are expected to register each semester. To be considered full-time, students must take 40 to 50 credits during the nine-month academic year (September to May), with a minimum of 20 credits per semester. Students enrolled in fewer than 20 credits in a semester are considered part-time.

Degree candidates are required to pay full-time or equivalent tuition for a designated number of

credits, depending on the length of their program (for example, a student in the MPH program must pay tuition for a minimum of 40 credits in order to receive the degree.) Doctoral students who earned an HSPH master's degree within three years of beginning the doctoral program are credited with tuition paid during their master's program. The *Student Handbook*, distributed at registration, provides detailed information about course load and tuition requirements for degree programs.

Incoming full-time degree candidates and special students receive a bill for fall semester tuition and fees in July and on a monthly basis thereafter. (Students matriculating as degree candidates during the summer receive a bill that includes both summer and fall tuition.) Spring semester tuition and fees are charged to the term bill in December. Part-time tuition is assessed after a student has registered each semester and is determined by the number of credits for which the student is registered. Other charges that may appear on the term bill include course materials charges, library fines, any charges not covered by the University Health Services fee (for example, some dental and optical shop charges), and rental charges from Harvard Real Estate. Students who are sponsored by a non-Harvard funding agency (for example, the World Health Organization or the US military) must provide original award letters from the sponsoring agency outlining the US dollar amount awarded, the terms of payment for each year the student will be funded, and the duration of the sponsorship. While the sponsor is billed directly at midsemester, all charges and credits appear on the student's monthly term bill.

Harvard faculty and staff, Harvard alumni, affiliates (except those in summer programs), and Boston-area public health professionals enrolled in nondegree status do not receive a term bill, but must pay all tuition and fees in full when they register. Payment is not refundable if the student elects to drop the course(s) for which he or she has registered.

Student Support Services

The Office for Students provides support services and offers educational, social, and cultural programs that enhance the academic experience, facilitate student development, encourage interaction among students, and help students to cope with the many demands of their academic and personal lives. Staff in the Office for Students adhere to a philosophy of continuous improvement in their efforts to help students achieve their greatest potential as individuals and as members of the public health profession. The office is engaged in recruiting students and postdoctoral fellows, investigating sources of student financial aid, counseling prospective and current students, maintaining liaison with the student government and other student groups, and addressing particular needs and concerns of students, both individually and through special programming.

Student Organizations

The Student Coordinating Committee (SCC) includes elected representatives from each department and Master of Public Health concentration and from the Division of Biological Sciences. The SCC meets regularly to discuss issues and plan activities related to student life at HSPH and provides a mechanism for working with members of the school's faculty and administration on school-wide issues, for sponsoring seminars and other educational programs, for organizing social activities, and for participating in the planning of Commencement. The SCC also arranges for student representation on several of the school's standing committees, including the Committee on Admissions and Degrees, Committee on Educational Policy, Committee on the Use of Human Subjects in Research, Computing Advisory Committee, and Faculty-Administration-Student Liaison Committee. The outreach arm of the SCC is the Student Community Health Outreach Organization (SCHOOL), a group which organizes collaborative activities between HSPH students and members of the community. These activities have included tutoring programs, a toy drive, and a dinner dance for senior citizens.

Other student organizations include the Health and Human Rights Committee, Hispanic/Spanish Students and Alumni Committee, Minority Student Health Organization, Asian Student Association, Women in Public Health, and the Lesbian, Gay and Bisexual Association.

For information about registration and billing procedures, please contact the HSPH Registrar's Office, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1032
Fax: 617-432-2009
E-mail: manthony@sph.harvard.edu

For information about services provided by the Office for Students or about student organizations and activities, please contact Cassandra A. Simmons, PhD, Assistant Dean for Students, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1036
Fax: 617-432-3184
E-mail: csimmons@sph.harvard.edu

Assistant Dean for Students Cassandra Simmons (third from left) accompanied HSPH students on a trip to South Africa during spring break. The group met with health officials, visited health centers, and toured schools of public health.

Prospective minority students are encouraged to contact Cassandra A. Simmons, PhD, Assistant Dean for Students, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1036
Fax: 617-432-3184
E-mail: csimmons@sph.harvard.edu

For information about services offered by the Harvard University International Office, please contact Maureen Martin, Advisor to Foreign Students and Scholars, Harvard International Office, 1350 Massachusetts Avenue, Cambridge, MA 02138.
Phone: 617-495-2789
Fax: 617-495-4088
E-mail: m_martin@harvard.edu

The Minority Postdoctoral Fellowship Program provides a bridge between academic training in public health disciplines and entry-level faculty positions for members of underrepresented minority groups. Each fellow works closely with a faculty mentor who helps to foster the fellow's professional development in teaching and research. Fellows normally complete the program in two years, having established an independent research agenda, published papers in peer-reviewed journals, obtained independent grant support, and gained sufficient teaching experience to develop their own courses. Fellows participate in activities designed to involve them fully in the formal and informal life of the academic community.

Candidates for this program are American citizens or permanent residents belonging to one of the minority groups (African American, Hispanic/Latino, and Native American) underrepresented in the faculty ranks. All applicants must hold an earned doctoral degree in a field appropriate to their area of interest at HSPH. The fellowship carries a competitive stipend. For more information, please contact Cassandra A. Simmons, PhD, Assistant Dean for Students.

Minority Students

The increased participation of underrepresented groups in public health practice and research is essential to the advancement of health in the United States and around the world. The school is committed to expanding the diversity of its faculty, staff, and student body, and members of US minority groups are urged to identify themselves for special recruitment efforts.

The HSPH Minority Student Health Organization (MSHO) plays a leading role in presenting programs on public health issues concerning underserved populations. During the 1994-95 academic year, MSHO sponsored a series of films, lectures, and cultural activities during Black History Month and hosted workshops for students and community activists addressing minority health concerns. The HSPH Hispanic/Spanish Students and Alumni Committee takes up issues of importance to that constituency. The Asian Student Association (ASA) promotes both cultural activities at HSPH and Asian student involvement in the community.

The Third World Caucus (TWC) brings together minority students from throughout Harvard's Longwood campus, which includes the medical, dental, and public health schools. TWC comprises four organizations: the Black Health Organization, Boricua Health Organization, National Chicano Health Organization, and Native American Health Organization.

International Students

During the 1994-95 academic year, approximately 33 percent of HSPH students came from outside the United States, representing 49 countries. The experience international students bring to the school lends an important dimension to the academic program and adds to the diversity of the student population. International students organize many cultural events at the school, such as celebrations of Chinese New Year, the Latin American Equinox Festival, and other holidays, and participate in the annual International Night talent show. The HSPH Office for Students sponsors a student host program for international students, which matches incoming students with continuing students.

The Student Coordinating Committee sponsors an annual dinner dance for senior citizens.

The Office for Students also helps foreign students adjust to life in the United States. The office sponsors ESL classes at different levels, hosts the Global Chat (a weekly lunchtime meeting that gives students an opportunity to practice their English while learning about each other's native country), and organizes social events and local excursions. Staff in the Office for Students are available to meet with students to discuss personal or academic problems and to assist students and their families who have questions about living in Boston and the United States.

The Harvard International Office, located on the Cambridge campus, provides a variety of services to students from abroad, including orientations, newsletters, and cross-cultural workshops. One program, the Friends of International Students, matches students with a person or family who will welcome them and ease their transition to the US. Maureen Martin, Advisor to Foreign Students and Scholars in the Harvard International Office, holds biweekly office hours at HSPH, during which time she is available to assist students with visa matters and to advise them on immigration regulations.

Child Care Facilities

There are a number of child care facilities available to students on the Longwood and Cambridge campuses. Arrangements should be made as early as possible, as facilities are quickly filled. For further information about these centers and other child care options in the area, please contact the Office of the Child Care Advisor at 617-495-2851. The Medical Center Office for Parenting at 617-432-1615 can also provide information on support services, resources, and programs.

Career Services

The manager of career services, Andrea Wolf, helps students and alumni assess their skills and goals, explore career options, learn to write resumes and cover letters, develop interviewing skills, and apply for fellowships. The office sponsors numerous workshops on aspects of the job search, panel discussions featuring public health professionals from a variety of fields, professional development seminars on such topics as "Communication Skills for the Public Health Professional," and an annual Career Day, which draws potential employers representing private and nonprofit institutions, international organizations, and governmental agencies. In the Career Resource Center, students have access to listings of current job openings, information about fellowships and internships, and files on many health care organizations. The office produces a monthly job opportunities bulletin and maintains a growing data bank of alumni career advisors.

For more information about career services, please contact Andrea Wolf, Manager of Career Services, Office for Students, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-2401
Fax: 617-432-3184
E-mail: awolf@sph.harvard.edu

HSPH's annual Career Day provides students with information about job opportunities.

For more information about alumni activities, please contact Sheila A. Kiernan, Director of the Annual Fund and Alumni Relations, HSPH Development Office,
116 Huntington Avenue, Boston, MA 02115.
Phone: 617-351-0162
Fax: 617-351-0106
E-mail: skiernan.dev@sph.harvard.edu

For more information about alumni-applicant contacts, please write or call Cassandra A. Simmons, PhD, Assistant Dean for Students, 677 Huntington Avenue, Boston, MA 02115.
Phone: 617-432-1036
Fax: 617-432-3184
E-mail: csimmons@sph.harvard.edu

Alumni Association

The Alumni Association of the Harvard School of Public Health enjoys an active membership of over 6,000 graduates worldwide. The association is governed by an elected council of twelve members who meet three times each year. Regional gatherings of alumni are often organized in the United States and abroad by members of the association with assistance from the HSPH Office of Alumni Relations. Members of the association are also active in raising funds for student scholarships and travel grants.

The following is a list of HSPH alumni who are available to answer questions that potential applicants may have about departments, curricula, possible career opportunities, and alumni activities. They may also be able to suggest other alumni whose academic and/or career interests more closely match an applicant's or who live in the applicant's immediate area.

Alumni-Applicant Contacts

United States

Robert Antosia, MD, MPH'94
(Environmental Health)
32 Commonwealth Avenue #6
Boston, MA 02116-3132
Home: 617-262-1226

Andrew Barnosky, MD, MPH'94
(Health Care Management)
9755 Lakewood
Grosse Ile, MI 48138
Home: 313-671-5247
Work: 313-246-6000

Bhaswati Bhattacharya, MPH'93
(International Health)
172 Fifth Avenue #3B
New York, NY 10010
Home: 212-645-6745

Michelle Bowdler, SM'93
(Health Policy and Management)
24 Chestnut Street
Framingham, MA 01701
Home: 508-788-1273
Work: 617-541-3600

Rex Chiu, MPH'94
(Public Management and Community Health)
435 E. 70th Street #5D
New York, NY 10021
Home: 212-517-9158
Work: 212-746-2900

Julie Berny George, MD, MOH'94
(Occupational Health)
199 Park Drive #33
Boston, MA 02215
Home: 617-536-1937

Daniel Glatt, MD, MPH'92
(Public Management and Community Health)
6514 Ambrosia Drive #5307
San Diego, CA 92134

Anita Jackson, MD, MPH'93
(Public Management and Community Health)
993 Harbor Club Circle East #102
Memphis, TN 38103
Home: 901-522-8784

Candace Keller, MD, MPH'93
(Health Care Management)
2902 Lincoln Road #14
Hattiesburg, MD 39402
Home: 601-264-4509
Work: 601-264-6283

Salmaan Keshavjee, SM'93
(Tropical Public Health)
P.O. Box 382311
Cambridge, MA 02238-2311
Home: 617-491-7622

Richard King, Jr., MPH'94
(Law and Public Health)
18 Main Street
Wilmington, DE 19807
Home: 302-984-1479

Christopher Spina, SM'91
(Health Policy and Management)
23 Lynnwood Drive
Westbury, NY 11590
Home: 516-997-6891
Work: 212-241-8473

International

Jose Castillo, MD, SM'93
(Epidemiology)
413 Emilio Carranza Sur
Monterrey Nuevo Leon, Mexico

Clarence Clottey, MD, MPH'91
(International Health)
P.O. Box T141
Accra Sports Stadium
Accra, Ghana

David Farrar, MD, MPH'93
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